

Is Sustainable Consumption the Right Way Forward?

The Potential of the Lateral Display Nudge to Stimulate Sustainable Consumption

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Abstract

Overconsumption of natural resources leads to a variety of serious environmental problems. Sustainable consumption needs to be stimulated to protect the future of the Earth. Recently, the consumption of healthy food was stimulated by laterally changing the display position, referred to as the lateral display nudge. Can the lateral display nudge be implemented to stimulate sustainable consumption? An online experiment was conducted in which a phone case design website is simulated. Participants could choose between options for several components of the phone case, some of which have a sustainable option, using so-called configurators. In different conditions, the lateral position of the sustainable option was manipulated. The results indicate that the lateral display nudge did not have an influence on the choice for sustainable options. Further research is needed to examine the potential of the lateral display nudge to stimulate sustainability and to examine the potential of other nudges to stimulate sustainability using product configurators.

Keywords: Sustainable consumption, green nudges, mass customization, product configurators, lateral display manipulation

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Is Sustainable Consumption the Right Way Forward?

During recent decades, we have shifted towards a consumer society, where consumption is seen as the primary way of achieving happiness (Brown & Cameron, 2000). The global consumption has grown explosively and the comfort, convenience, and choices of consuming are unparalleled (Sustainable Consumption Roundtable, 2006). However, this led to an excess consumption of goods, referred to as overconsumption, and is starting to put a strain on the earth and its natural resources (Chen & Chai, 2010). Major threats to the Earth's environment are caused by our unsustainable consumption patterns. Except for the well-known consequences like global warming and the destruction of the ozone layer, other threats caused by human behavior include; increased exposure to toxic chemicals, loss of biodiversity, land degradation (Oskamp, 2000), and a whole range of other environmental impacts (Princen, 1999). Changes are necessary if we want to keep the planet habitable for future generations.

The increasing awareness of the environmental issues caused by overconsumption has led to the emergence of sustainable development, that promotes sustainable production and consumption (Joshi & Rahman, 2015). Industrial ecology has successfully improved the resource efficiency of production systems. However, sustainable production in itself is not enough to achieve sustainable development. Technological advancements are important but will not ensure that consumers consume in an environmentally friendly way nor that the scale of consumption will remain within the ecological boundaries. In order to achieve sustainable development, change is needed in human behavior and the current unsustainable consumption culture (Jackson, 2005).

Consumers acknowledge this and show an increasing interest in sustainable consumption (Berry & McEachern, 2005), like the consumption of green products (Rex & Baumann, 2007), that have a low impact on the environment (Janssen & Jager, 2002). However, a positive attitude or intention towards sustainable consumption does not necessarily translate into behavior (Grunert, Hieke, & Wills, 2014). Research consistently finds a gap between sustainable consumption intentions and actual purchase behavior (e.g., Vermeir & Verbeke, 2006; Bray, Johns, & Killburn, 2011; de Barcellos, Krystallis, de Melo Saab, Kügler, & Grunert, 2011). A growing body of research examines the factors impeding this intention-behavior relationship (e.g., Bray et al., 2011; Kollmuss & Agyeman, 2002; Carrigan & Attalla, 2001; Carrington, & Whitwell, 2014; Johnstone & Tan, 2015), but integrating the principles of sustainable consumption into everyday behavior remains a major

policy challenge for governments (Seyfang, 2006). The most common policy is still the provision of information to educate consumers on pro-environmental behavior, which is often not enough to bridge the intention-behavior gap (O'Rourke & Ringer, 2015). Conventional policy methods rely on rational behavior (Venkatachalam, 2008), while in reality, humans have bounded rationality. Humans are prone to biases and rely on rules of thumb and habits to make decisions (Thaler & Sunstein, 2008). In order to ensure a more sustainable consumption culture, consumers might need a little "push" that helps them to translate their intentions into behavior. Insights from consumer behavior can help to understand this behavior and aid in making more effective and efficient policies (Lehner, Mont & Heiskanen, 2016).

A relatively new concept in consumer behavior that capitalizes on the bounded rationality in human decision making is nudging. Nudges refer to simple changes in the decision context of consumers that give them a little push in the right direction without forbidding any options. They work by addressing biases and heuristic cues in consumer decision making (Van Kleef & van Trijp, 2018). Nudges are a cost-efficient way to alter consumer behavior since no economic incentives are given and can solve a wide range of policy problems (Benartzi et al., 2017). More relevantly, nudge tools are a promising tool to stimulate sustainability (e.g. Sunstein & Reisch, 2014., Lehner et al., 2016; Hankammer, Kleer & Piller, 2018b).

Recently, a nudge was successfully used to enhance the preference for a healthy meal choice by making a simple change in the lateral position in which the meals were displayed (Romero & Biswas, 2016). More concretely, participants showed a relatively greater preference for the healthy item when it was displayed on the left of the unhealthy item than when it was displayed on the right of the unhealthy item. Furthermore, when the healthy item was displayed on the left it led to a higher subsequent consumption volume. The underlying theories of the research are based on *mental representations*; e.g. humans tend to mentally organize increasing magnitudes from the left to the right. In the example of food choices, Romero and Biswas (2016) argue that individuals see healthy foods as less filling, lighter, less tasty and having few calories as unhealthy foods and will therefore mentally map the healthy food choice on the left. When the real display was consistent with their so-called mental representation (healthy food choice is displayed on the left relative to the unhealthy choice), it increased the preference and the subsequent consumption volume of the healthy food choice.

Given the efficiency and simplicity of this nudge, hereafter referred to as *the lateral display nudge*, it would be very interesting to see if this nudge is adaptable and can be

implemented to encourage sustainable consumption. A business model that might have the potential to implement the lateral display nudge is mass customization. In this business model, products are mass produced but consumers are able to modify the product towards their own needs by using special toolkits, or product configurators, that are provided by the business. An example of a mass customization e-retailer that provides customers with a sustainable option in their product configurator is Vistaprint. Vistaprint enables customers to customize their own business cards on their website. Customers have to make choices for several components of the product (e.g. paper thickness, material, the shape of corners). When choosing the material of the business cards, customers have the option to choose sustainable materials like recycled matte or Kraft (Figure 1). Selecting an option will expose the customer to additional information like the feel of the paper, a description of the selected material and, when applicable, sustainability information.

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Figure 1. Example of an online configurator with a sustainable option. From Vistaprint (n.d.).

As shown in the figure, the paper material “recycled matte” is on the left side and “Kraft” is on the right side, does the lateral position of these sustainable options influence their preference? Product configurators allow for convenient implementation of the lateral display nudge since the lateral position of the options can be easily adjusted.

Furthermore, the mass customization business model is a promising environment to stimulate sustainability because the high production volume enhances the impact of an effective nudge and configurators have shown potential to incorporate nudges that increase sustainability. For example, recent research showed that mass customization companies can nudge consumers towards the sustainable option by making small changes to the product configurators (Hankammer et al., 2018b). In their experiment, an online television product configuration website was simulated where participants could make choices for several attributes of the TV (e.g. screen size or material of the frame). For the components that had a sustainable option (e.g. frame out of bioplastic instead of plastic or aluminum), it turned out that if the sustainable option was the default option, it significantly increased the choice for the sustainable option. Whilst the effectiveness of default nudges have been well documented (See e.g. Johnson & Goldstein, 2003), the potential of the lateral display nudge has been unexplored in its potential to stimulate sustainable consumption.

Objective and Research Question

Answering the call for research on alternative nudges that can stimulate sustainability in an online mass customization context (Hankammer et al., 2018b), the objective of this research is to examine the potential of the lateral display nudge to stimulate sustainable consumption using product configurators. Instead of making the sustainable option the default option, the lateral display position of the sustainable options will be altered to align with the mental representations of the customers, which subsequently, might increase the preference for the sustainable options. This leads to the following research question:

“Can consumers be nudged to choose the sustainable options by implementing the lateral display nudge in a mass customization context?”

The results of this research contribute to existing knowledge by (1) providing insights into the opportunities for companies and policymakers to promote sustainable consumption, (2) extending on research of the potential of nudges to promote sustainability, (3) providing additional insights into the flexibility of the lateral display nudge, and (4) further examining the potential of configurators to stimulate sustainable consumption.

An online experiment was conducted where participants customized their own phone case using a simulated online mass customization webshop. The participants used product configurators to choose between several options for each component of the phone case (e.g. material). Some of these components had a sustainable option (e.g. plastic as unsustainable option and bamboo as a sustainable option for material). In different conditions, the lateral display nudge was tested by changing the lateral position of the sustainable options in the product configurators.

Outline

The remainder of this paper will be constructed as follows: First, an overview will be given of the theoretical background related to sustainable consumption, mass customization, and the lateral display nudge. This background leads to the hypothesis and an illustration of the conceptual model (chapter 2). Secondly, the methodology for the pretests and online experiment will be discussed (chapter 3). Thirdly, the results will be presented (chapter 4), which is finally followed by a discussion, the theoretical and managerial implications, and the limitations and future directions of the research (chapter 5).

Theoretical Background and Hypothesis

Sustainable Consumption

The overconsumption of natural resources is one of the main causes of a number of environmental problems that threaten both the environment and human life. To overcome these threats, urgent changes are needed in human behavior and their current cultural patterns of unsustainable consumption (Oskamp, 2000). The problem of overconsumption is deeply rooted in the current social and economic paradigms and solutions thus require a wider view than just environmental protection. Therefore, the global society has shifted focus towards sustainability, which also considers the economic and social dimension of the problem (Finkbeiner, Schau, Lehmann, & Traverso, 2010). The concept of sustainable development was firmly established nationwide in 1992 at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro.

The Rio conference stated the pursuit of sustainable consumption and production as one of the main pillars of achieving sustainable development (Barber, 2003). Improving the current technologies of production is helpful but only solves a part of the problem and, in itself, is not sufficient to solve the challenges we face. The scale of the consumption, especially in industrialized countries, overwhelms the improvements made by technological innovations (Mont, 2004). Furthermore, an improvement in the eco-efficiency of consumption is often compensated by an increase in consumption, the so-called rebound effect (e.g. Sorrell & Dimitropoulos, 2008; Greening, Greene & Difiglio, 2000; Binswanger, 2001; Hertwich, 2005). Therefore, changes need to be sought out in consumption levels and patterns (Mont, 2004).

Consequently, sustainable consumption has become an important objective of the global agenda. The Oslo symposium of sustainable consumption in 1994 defined sustainable consumption as: "the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations." (Norwegian Ministry of the Environment, 1994). The key principles of sustainable consumption thus require changes in the current consumption patterns (Fuchs & Lorek, 2005), and largely depend on the motivation and ability of customers to change their behavior (Peattie, 2010). Some consumers, labeled as ethical or green consumers, engage in sustainable behavior without governmental intervention (Connolly & Prothero, 2008). However, there remains a large attitude-behavior gap for

consumers that show an intention to act in an environmentally friendly way (e.g., Vermeir & Verbeke, 2006; Bray et al., 2011; de Barcellos et al., 2011). Customers face the moral dilemma of paying a price, sacrificing personal gain, in favor of a somewhat intangible and abstract benefit for the environment (Sachdeva, Jordan & Mazar, 2015). Assisting consumers to overcome the attitude-behavior gap can pose a significant challenge for policymakers, but insights from consumer behavior can aid in facilitating this change (Lehner et al., 2016). Green consumption can be stimulated by changing the decision context of green consumption choices (Sachdeva et al., 2015).

Nudging

Environmental policymakers traditionally focused on providing information to motivate sustainable consumption (O'Rourke & Ringer, 2015), but these policies mostly rely on unbounded rational behavior of customers (Venkatachalam, 2008). In reality, individuals are prone to biases and do not act completely rational (Thaler & Sunstein, 2008). As a consequence, behavioral environmental policies that utilize the bounded rationality of human decision making have surfaced as complementary policy tools. An important policy instrument of the behavioral environmental policies is the use of green nudges (Schubert, 2017). Nudging is defined as: "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler & Sunstein, 2008, p. 6). The choice architecture refers to the context in which the decision is made (Quigley, 2013), or "the way the choices are presented, framed and structured" (Schubert, 2017, p. 3). Accordingly, the choice architecture in this research is mostly related to the structure of the product configurators, which will be elaborated upon in a later chapter.

Green nudges are nudges that try to stimulate sustainable behavior. For example, a dominant part of the research on green nudges examines the use of nudges to stimulate energy conservation (Schubert, 2017). According to Schubert, green nudges can be divided into three categories. Firstly, green nudges that use the desire of customers to express themselves by engaging in pro-environmental behavior by either simplification of information or making certain product characteristics more salient. The lateral display nudge that is examined in this research focusses on facilitating green behavior directly by presenting the information in a way that fits the information processing and decision-making processes of the individuals, which reduces the cognitive costs needed to make the sustainable choice. This type of nudge corresponds to the first category of green nudges described by Schubert.

Secondly, green nudges that use people's tendency to compare themselves to others. These work for example by using social norms to exert peer pressure to engage in pro-environmental behavior. Lastly, green nudges that utilize the effects of default options. People dislike engaging in active choices and tend to stick with the default option. The research by Hankammer et al. (2018b) successfully implemented the default effects of defaults options to stimulate sustainable consumption.

Mass Customization

The term mass customization was introduced in the book *Future Perfect* by Davis (1989). In the book, Davis argued that the established industry at that time consisting of either mass production or individually customized products. Mass production has the advantage of economies of scale but in essence, cannot distinguish between customers' individual needs. Customized products, on the contrary, can be adapted to the need of the consumer but have the problem of high costs per unit. To solve the dilemma of these seemingly contradictory industries, innovative companies shifted towards mass customization (Davis, 1989). A few years later, the term got refined to business approach (Pine, 1993). A good implementation of mass customization, defined as "To deliver goods and services that meet individual customers' needs with near mass production efficiency" (Tseng & Jiao, 2001, p. 685), can lead to competitive advantages for companies by pairing both advantages of mass production and customized products (Salvador, de Holman, & Piller, 2009). Mass customization provides multiple opportunities to integrate the need of the customer considering that every step in the process requires an interaction between the company and its customers. In many cases the consumer does not only provide information but also aids in creating the product, this is referred to as customer co-creation (Piller, 2004). The co-creation phase allows customers to voice their needs and choose between product specifications (Piller, Schubert, Koch, & Moesleim, 2004). An example of an implementation of the mass customization model particularly relevant to this research is through configurable products, in which customers can configure their product by making choices for a pre-designed set of components (Heiskala, Tihonen, Paloheimo, & Soininen, 2007). In the first step, companies need to assess which components of the products have varying needs for their customers and what these needs are. Secondly, the company needs to decide the range of options that it is will to offer to the customers for each component. The final step of the process is to provide toolkits to the customers and translate their choices into instructions for the production (Trentin, Perin, & Forza, 2014).

Configurators

The design of these toolkits is of critical importance for mass customization as they guide the consumers through the sales process (Franke & Piller, 2003). The internet created new possibilities for efficient and easy to use toolkits since the internet allows for effective interaction between the company and the customer (Lee & Chang, 2011; Piller, Moeslein, & Stotko, 2004). These online toolkits, or configurators, provide customers with information on all the parts of the product that are customizable and allow them to order the combination that they personally put together (Franke & Hader, 2014). Furthermore, they make sure the configuration is complete and does not violate any rules.

They are not only beneficial for the customer, but also provide the supplier with a wide range of benefits including benefits for the business, organization, sales specification process, manufacturing, product development, and long term management (see Heiskala et al., 2007). Apart from benefits, the configurators also pose challenges for the supplier, including the challenge of integrating sustainability (Pourabdollahian & Steiner, 2014). Referring back to nudging, the product configurator serves as the choice architecture for consumers, since it presents and structures the choices that the consumers have. Therefore, changes in the structure of the product configurator can potentially be used to nudge consumers and stimulate sustainability.

Stimulating Sustainable consumption in a Mass Customization model

Currently, research on the potential of mass customization to promote sustainable consumption remains scarce (Hankammer, Jiang, Kleer & Schymanietz, 2018a). However, Mora et al. (2016) provide an overview of mass customization business models that can integrate sustainability. A particularly relevant business model for this research is the development of a sustainable solution space. In this product configuration model, the business integrates a sustainable option into the defined set space of combinations, referred to as the solution space (Mora et al., 2016). This model shows great potential to implement the lateral display nudge. The set of options is pre-defined and includes a sustainable option and thus allows for convenient manipulations of the lateral position. According to Mora et al. (2016), the model requires the integration of co-creation and sustainability. Previous research emphasized the importance of the co-creation phase of mass customization and the potential of product configurators to stimulate sustainability (Badurdeen & Liyanage, 2011; Hankammer et al. 2018b, 2018b; Medini, Da Cunha, & Bernard, 2011; Kohtala, 2015). Hankammer et al. (2018b) examined the potential for product configurators to stimulate

sustainable choices using nudges. They created a simulated online mass customization environment and attempted to nudge participants towards the sustainable option by setting it as the default option and by highlighting sustainability information in the configurators. Out of the two nudges, only the default option significantly increased the preference for the sustainable option. This research will further expand their research by examining the potential of the lateral display nudge using a sustainable solution space.

Lateral Display Nudge

As previously mentioned, recent research indicated that a nudge referred to as the lateral display nudge can be used to stimulate the consumption of healthy food (Romero & Biswas, 2016). This nudge worked by placing the healthy option in congruence with where the participants mentally organized the healthy option, i.e. in congruence with their *mental representations*. To adapt the lateral display nudge from stimulating healthy choices to stimulating sustainability in an online mass customization context, it is important to predict the lateral mental representations individuals have regarding sustainable options. Research has found that people evaluate a stimulus more positively when the real display position is in congruence with their mental representations (e.g. Romero & Biswas, 2016; Kim, Roa, & Lee, 2008). Therefore, options of any kind can potentially be stimulated by matching the real display position with the mental representations.

This effect is mediated by the increased ease of processing, or processing fluency, resulting from this fit between mental representation and reality (Chae & Hoegg, 2013). But why does a high processing fluency lead to more favorable evaluations of a stimulus? Winkielman, Schwarz, Fazendeiro, and Reber (2003) propose that processing fluency is hedonically marked. They argue that high processing fluency is indicative of positive states of the cognitive system and elicits positive affect. As to why this is the case, they elaborate on several underlying possibilities. Firstly, high fluency is a cue that a stimulus is familiar, and people tend to prefer cues that are familiar and tend to avoid uncertainties. Therefore, a familiar cue leads to a more positive evaluation than an unfamiliar cue (See also Kelley & Rhodes, 2002; Whittlesea & Williams, 2000). In a similar vein, high fluency serves as a cue for prototypicality and symmetry, which are both associated with positive valence. Lastly, high fluency signals a successful recognition and interpretation of the stimulus, which provides motivation to complete the cognitive activity (Winkielman et al., 2003). An alternative underlying mechanism is that high processing fluency is associated with

heightened levels of perceived effectiveness, which leads to a more positive evaluation (Lee & Aaker, 2004).

Conceptual Model

To summarize, if the sustainable options are displayed in congruence with the mental representations of customers, it should increase their processing fluency. The increased processing fluency leads to a more positive evaluation of the sustainable options and will thus increase the subsequent preference for the sustainable options. The examined causal relationship is the influence of the lateral display position of the sustainable options on its subsequent choice and is illustrated in Figure 2. The next paragraph will elaborate on underlying mechanisms that aid the predictions of a consumers' mental representation of the sustainable option. Furthermore, a moderator variable will be introduced based on the Construal level theory. The control variable "dominant hand" will be elaborated upon in a further paragraph, and the control variables "product involvement" and "consciousness for Sustainable consumption" are introduced in the methodology chapter.

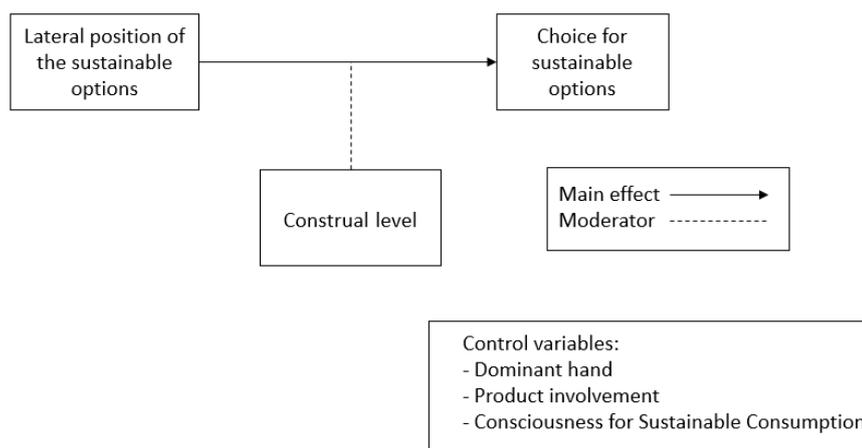


Figure 2. Conceptual model.

Predicting the Mental Representation

To predict the mental representations that consumers have of the lateral position of the sustainable options, several effects will be discussed. The first effect that might help to predict the mental representations of the sustainable options is the spatial-numerical association of response codes effect (SNARC effect). An experiment found that participants reacted faster to smaller numbers with their left hand and faster to bigger numbers with their right hand (Dehaene, Bossini, & Giraux, 1993). This supposedly originates from the fact that humans mentally organize numbers from the left to the right in a magnitude line, called the mental number line. In other words, smaller numbers (both absolute and relative) are

mentally associated with the left side and larger numbers with the right side (e.g. Fias, Brysbaert, Geypens, & d'Ydewalle, 1996; Gevers, Verguts, Reynvoet, Caessens, & Fias, 2006). In the context of food choices, the healthy choice is usually seen as having fewer calories, taste and being less filling than unhealthy food. Therefore, when the healthy option is placed on the left it would be congruent with the mental representation of the consumers and increase their preference for this choice (Romero & Biswas, 2016). When looking at perceptions of sustainability, consumers believe that sustainable products are more expensive (Harris, 2007; Young, Hwang, McDonald, & Oates, 2010) and last longer (Simpson & Radford, 2012). Thus, based on the mental number line, the mental representation of the sustainable options should be on the right relative to the unsustainable options.

Additionally, this mental representation is not limited to the spatial representation of numbers but also holds for the spatial representation of time (see also *A Theory of Magnitude*, Walsh, 2003). Research has found that humans order the spatial representation of time by placing the place the past on the left and the future on the right (Chae & Hoegg, 2013). Since sustainability is a concept that is closely intertwined with future orientation, this theory provides additional support for the hypothesis that the consumer's mental representation of the sustainable options is on the right. Concluding, both the spatial representation of time and numbers lead to believe that the mental representation of the sustainable options is on the right side relative to the unsustainable options. Displaying the options in congruence with the mental representations should lead to more positive evaluations, thus displaying the sustainable options on the right (vs. the left) should increase the preference for the sustainable options.

Hypothesis 1: Putting the sustainable options on the right (vs. left) relative to the unsustainable options enhances (decreases) the preference for the sustainable options.

Notably, both effects depend on cultural reading habits and only hold for left-to-right reading cultures. For example, while left-to-right reading cultures place the past on the left and the future on the right, the opposite is true for right-to-left reading cultures (Fuhrman & Boroditsky, 2010).

Body-Specificity Hypothesis and Construal-Level Theory

The construal-level theory proposes that the psychological distance from an object influences the abstractness of the thoughts of an individual. Psychological distance refers to

how far the subjective experience is relative to the self. The psychological distance is further specified in four main dimensions; spatial, temporal, social and hypothetical (Bar-Anan, Liberman, & Trope, 2006). Objects that are psychologically distant in one or more of the dimensions will lead to more abstract, big-picture thinking, referred to as a high-level construal. On the contrary, objects that are psychologically close will lead to more concrete thoughts where individuals are more focused on details, referred to as a low-level construal (Trope & Liberman, 2010).

The construal level theory will be illustrated with an example; when it is January and a student is questioned on his plans for the summer (distant in the temporal dimension thus a high-level construal), thoughts will, according to the construal-level theory, be very abstract. The thoughts might look like: my plans for the summer are to work, relax and go on a vacation. However, when the summer is near (proximal in the temporal dimension), thoughts will be much more concrete. In this case, the student will consider which activities to do to feel relaxed, when to do them, how much time it will take or how much the costs will be.

Additionally, these effects also work vice versa. Individuals with a high-level construal mindset will think more psychologically distant and individuals with a low-level construal will have more psychologically proximal thoughts. The construal levels that individuals hold can thus moderate the effects of the lateral display nudge. An individual in a high-level construal mindset will be more inclined to think of the more distant and abstract consequences of consumption (e.g. Mehta, Zhu, & Meyers-Levy, 2014). Since individuals with a high-level construal mindset think more abstractly and temporally distant, a high-level construal would enhance the effect of the mental representation of time, where individuals construe the future on the right. Furthermore, activation of high-level construals could enhance self-control (Fujita, Trope, Liberman, & Levin-Sagi, 2006), which leads to an increased choice for the option with the long-term benefits (see e.g. Howlett, Kees, & Kemp, 2008), which in this research is the sustainable option.

On the contrary, individuals that think in a low-level construal will be more focused on concrete and proximal thoughts like the immediate benefits of consumption. This will lead to an increased importance for attributes like price and appearance whereas the long-term environmental impacts of consumption are given less thought. Furthermore, low-level construals will lead to proximal thoughts and potentially moderate the effects of the mental representation of time. Concluding, the construal-level that an individual holds potentially moderates the effects of the lateral display nudge.

Hypothesis 2a: A low-level (high-level) construal moderates (enhances) the effects the lateral display nudge.

The body-specificity hypothesis states that the way that people think is dependent on the kind of bodies they have (Casasanto & Chrysikou, 2011). For example, research has shown that people associate good and positive things with the side of their dominant hand while the opposite is true for their non-dominant hand. This association is likely caused by the favorable fluency the dominant hand provides when interacting with the psychological environment relative to the clumsier non-dominant hand (Casasanto, 2009). This theory still holds for intangible and abstract things that are unrelated to the fluency provided by the dominant hand. Therefore, the body-specificity hypothesis is relevant to predict the mental representation consumers have of the sustainable options. The majority of people are right-handed, which means the mental representation of the good or positive option is dominantly associated with the right. Sustainability is a relatively abstract concept, making it is hard to predict if the consumer would see the sustainable option as the good or positive options compared to the unsustainable option. While the reduced environmental impacts of the sustainable option will be seen as positive by the majority of people, the options might also be judged on other attributes. If the options are judged on, for example, their price, the favorable option would probably be the unsustainable option which is usually cheaper. Concluding, based on the body-specificity hypothesis it is hard to predict the mental representation of the lateral position of the sustainable option.

However, what an individual sees as the good or positive option might depend on which construal level mindset they hold during their judgment. As established, a high-level construal increases the salience of long-term consequences and will, therefore, lead to a higher chance that the sustainable option is seen as the good or positive option. This will, according to the body-specificity theory, strengthen the mental representations of the sustainable option on the right for right-handed people

On the contrary, a low-level construal will increase the importance of short term benefits and thus decrease the chance that the sustainable option is seen as the good option. In this case, the body-specificity hypothesis will contradict the mental representations of the sustainable option on the right and potentially moderate the effects.

Hypothesis 2b: When the construal level is high (low), and people are right-handed, it enhances (moderates) choice for the sustainable option when it is positioned on the right

Hypothesis 2c:: When the construal level is high(low), and people are left-handed, it enhances (moderates) choice for the sustainable option when it is positioned on the left

Method

Research Design

The goal of this research is to examine the causal relationship between the lateral display position of the sustainable option and the subsequent choice for this sustainable option. Experimental research methods are best suited to examine cause-and-effect relationships (Field, 2013). The best way to examine this relationship would be to use or create an e-commerce web shop that supports product configuration and manipulate the lateral display position of the options. However, due to restricted time and the inaccessibility to collaborate with such a company, manipulation in a real-life setting was infeasible. Instead, an online experiment was conducted where an online product page with a sustainable solution space was simulated inside a survey. Participants were asked to fill a survey that consists of 3 phases. First, participants were introduced to the survey, and their construal level was manipulated. After, they were randomly assigned to a treatment (Sustainable options on the left vs. right) of the product customization page. Finally, participants referred to the final stage of the survey where they had to react to some statements to measure the control variables. They could open this survey online by opening an URL on their computers, laptops, smartphones or other smart devices with access to the internet.

Research Setting

Hankammer et al. (2018b) argue that electronic consumer goods are especially suited for analyzing sustainable consumption. One of the reasons being, that consumers purchase these products in increasing frequency due to rapid technological advancements and planned obsolescence. A byproduct of this trend is the increasing online popularity of phone cases and screen protectors. Research in 2017 found that 79% of smartphone users in the US use a protective case (Statista, 2017). Unfortunately, most of them only fit on one specific smartphone model and are made from unsustainable materials like plastic. According to Pela, a webshop that sells sustainable cases and screen protectors, over 1 billion screen protectors are thrown away each year (Pela, n.d.). With around 4 pieces of plastic per screen protector, this amounts to a lot of waste and pollution.

Nudges are based on biases and heuristics, which are typically more relied upon in low-involvement situations. Accordingly, nudges could have a higher impact in a low-involvement decision context (e.g. Michalek, Meran, Schwarze, & Yildiz, 2016). Compared to TV's used in the experiment by Hankammer et al. (2018b), phone cases and screen protectors are a relatively low involvement product. Thus, these products are potentially more suitable for examining the effects of the lateral display nudge and used for the experiment.

Stimulus Development

Using the software Qualtrics, an online survey was conducted. This survey simulated an online e-commerce website that sells customizable phone cases. Respondents were asked to imagine the following scenario:

“In this simulation, imagine that you are looking to protect your phone by purchasing a phone case and a screen protector. While looking in the stores, you can't quite find the one you like. Thus, you decide to go online and find a store that offers customizable phone cases. You just found the (fictional) website www.designyourcase.com and are ready to start designing.....“

In the survey, participants were guided through several steps of the product configuration of the phone case. The options consisted of a selectable area, which participants could use to choose an option, the participants were forced to select only one option. In the first step, participants could select their phone brand and model to start the configuration process. An address bar was included above each step to make it look more like a real configuration website, to get an idea of the look of the simulation, see Figure 3.

Removed due to copyright considerations.

Figure 3. Look of the survey for the first step of the customization simulation.

In the following steps of the configuration phase participants could create their own phone case by choosing between options for 7 customizable components: Case type, material and screen protector (step 2), design (step 3), delivery method, delivery service and packaging (Step 4). Each of these components had 2-4 selectable options (e.g. Plastic, leather, silicon, and bamboo). The whole range of options is shown in table 1.

Table 1

Solution Space for Phone Case Configuration

Component	Options	Description
Case type	Tough case	Tough cases are very compact and offer a medium level of protection without forfeiting style
	Slim case	These cases improve the chances of surviving a fall and will protect your phone from scratches where the surfaces are covered
	Rugged case	These are one of the best protective cases out there. These vastly reduce the damage in case of an accident
Material	Plastic	Plastic phone case
	Leather	Tanned leather case
	Silicon	Silicon phone case
	Bamboo (Eco-choice)	100% natural eco-friendly bamboo
Screen protector	Plastic	Plastic screen protector
	Tempered glass	Tempered glass screen protector
	Liquid screen protector (Eco-choice)	Liquid screen protector made from eco-friendly materials
Design	Choose from existing designs	(List with designs to choose from)
	Choose my own color and the possibility to add emoticon stickers	(Select color of the case and ability to add emoticon stickers)
	Text	(Option to add text, which can be positioned by clicking on an empty phone case)
Delivery method	Pick up point	N/a
	Home delivery	N/a
Delivery service	Standard	Ordered before 16:00, delivered next day.
	Express delivery	Ordered before 16:00, delivered the same day.
	Eco-choice	Ordered before 16:00, delivered using electric cars in 3-5 days.
Packaging	Standard	Phone case wrapped in plastic and delivered in carton box
	Eco-choice	No plastic wrap and delivered in a box made of recycled carton

Note. Sustainable options are indicated in **bold**.

The components case type and design were added to resemble existing phone case configuration websites, and to avoid hypothesis guessing. The options were illustrated with selectable images that contained an inscription text. The options were displayed laterally to enable manipulation of the lateral display positions. The sustainable choice was displayed with an eco-choice label, to emphasize the sustainable nature of the option (Figure 4).

Removed due to copyright considerations.

Figure 4. Example of options for material with the sustainable option on the left.

After selecting the packaging, respondents were thanked for completing the phone configuration simulation and further directed to complete the last stage of the survey. The sequence of the survey is illustrated in the table 2. The full survey used for the main experiment can be found in Appendix C.

Table 2

Structure of The Survey

1	Introduction
2	Manipulation construal-level
3	Configurator step 1: Introduction
4	Configurator step 2: Type of case, material, and screen protector
5	Configurator step 3: Design
6	Configurator step 4: Delivery method, service and packaging method
7	Manipulation check
8	Product involvement
9	Consciousness for sustainable consumption
10	Demographics (Including dominant hand)
11	Closing message

Measures

To induce high- or low-level construals, participants had to complete a small manipulation task before completing the phone case configuration phase. Since there are multiple ways to manipulate construal levels, two pretests were conducted to find the most appropriate method. After the configuration phase, the survey contained a manipulation check and several control factors. The participants' construal levels were measured using a shortened Behavioral Identification Form (BIF) adapted from Vallacher and Wegner (1989), which has been dominantly used to measure construal levels in previous related research (e.g.

Kim & John, 2008; Alter, Oppenheimer, & Zemla, 2010; Fujita et al. 2006; Stephan, Liberman, & Trope, 2011).

Additionally, the degree to which a respondent is involved with sustainable consumption can influence the results of the experiment because it could affect the choices they make for the components that have sustainable and unsustainable options. Therefore, inspired by Hankammer et al. (2018b), the environmental dimension of the Consciousness for Sustainable Consumption (CfSC) scale will be used to assess the respondent's beliefs (7-point Likert scale) and importance (5-point Likert scale) regarding sustainable consumption. The environmental part of the CfSC scale is based on Balderjahn et al. (2013), that conducted an extensive literature review to identify the key environmental factors for sustainable consumption. The questions were placed after the product configuration to avoid priming or biasing the participant towards the sustainable option. Product involvement (7-point Likert scale) was measured using a 4 item scale adapted from Zaichkowsky (1985). Finally, the survey included demographic questions and a question about the dominant hand to control for the body-specificity hypothesis. Table 3 presents an overview of the scales used in the survey in the survey.

Table 3

Scales of The Survey

Construct	Items	Adapted from
Environmental Consciousness for Sustainable Consumption	<p>I buy a product only if I believe it....</p> <p>...is made from recycled materials.</p> <p>...can be disposed of in an environmentally friendly manner.</p> <p>... is packed in an environmentally friendly manner.</p> <p>... is produced in an environmentally friendly manner.</p> <p>How important is it for you personally that a product...</p> <p>...is made from recycled materials.</p> <p>...can be disposed of in an environmentally friendly manner.</p> <p>... is packed in an environmentally friendly manner.</p> <p>... is produced in an environmentally friendly manner.</p>	Balderjahn et al. (2013).
Product involvement	<p>I would be interested in reading information about phone cases.</p> <p>I have compared product characteristics among brands of phone cases.</p> <p>I think there are a great deal of differences among brands of phone cases.</p> <p>I have a most preferred brand of phone cases.</p>	Zaichkowsky (1985).

Pretests

A pretest in the form of an online survey was conducted to test the effectiveness of a construal level manipulation, to examine the lateral placement of words relating to sustainability, and to confirm that the intended sustainable option is perceived as the most sustainable out of the options. In total 27 respondents participated in pretest 1. The respondents consisted of 16 men (59%) and 11 women (41%), and the majority of the respondents were students from Dutch universities.

Pretest 1.1. In order to test the natural lateral organization of the sustainability and unsustainable option, an experiment was conducted based on study 2 from Romero and Biswas (2016). Participants conducted a conceptual classification task in which they were exposed to pairs of words related to sustainability, based on the options used in the main experiment. The survey contained two empty text boxes to simulate lateral positions, one on the left side and on the right of the page. Participants were asked which word of the word pair they would prefer to put in the left text box. The order of the word-pairs was counterbalanced to avoid any influence from the sequence that the participants were exposed to. The word-pairs used to test the lateral mental representation of sustainability were: Sustainable – Unsustainable, Plastic – Bamboo, Standard – Eco-choice. Filler word pairs were added to

stop respondents from hypothesis guessing (Healthy – unhealthy, clouds – sky, bike – skateboard).

Results and discussion. In congruence with the study by Romero and Biswas (2016), the majority of participants associated the healthy (vs. unhealthy) concept with the left later field (N = 25). However, this effect did not occur when the order of the words was counterbalanced (~50%). Similar effects are found for the word-combinations sustainable (vs. unsustainable) and plastic (vs. bamboo), the effects completely diminished after counterbalancing the sequence. The only consistent finding is for eco-choice (vs. standard), which was placed consistently on the right (75%) and remained the same after counterbalancing. The results show that only eco-choice (vs. standard), is consistently placed on the right. This supports the choice to use eco-choice labels for the sustainable options. For all other word-pairs, the order of the presented sequence seemed to have the largest influence on preference. Therefore, the pretest did not support the hypothesized mental representation of the sustainable option on the right.

Pretest 1.2. After the conceptual classification task, the effectiveness of a construal-level manipulation method was tested. The manipulation used in this pretest was based on a word-generation tasks, that is used in previous research to manipulate construal levels (e.g. Henderson & Trope, 2009; Gong & Medelin, 2012). Participants were asked to generate three increasingly abstract superordinate category labels for four given words to induce a high-level construal and three increasingly concrete subordinate category labels to induce a low-level construal. This was done by asking “.... Is an example of what? (make more abstract)” three consecutive times. Participants were tasked to write down the answers in text boxes. To induce a low-level construal the question was framed as “An example of Is what? (make more concrete)”

For example, when participants are completing this task and one of the words is “car”, typical answers for participants in the high-level construal treatment would be: A car is an example of a *wheeled motor vehicle*. A wheeled motor vehicle is an example of a *vehicle*. A vehicle is an example of a *man-made object*. For the low-level construal typical answers would be: An example of a car is a *sports car*, an example of a sports car is a *Porsche* and an example of a Porsche is a *Porsche 911*. They then continue the task by repeating this process for the four remaining words. By stimulating the participants to repeatedly think in a more abstract (concrete) way, a high-level (low-level) construal was induced. The four words were: Shoe, Dog, Mobile phone and Car. All results were examined by two separate researchers to verify that the task has been done correctly.

Manipulation check. The Construal levels of the respondents were measured with a shortened version of the BIF (Vallacher & Wegner, 1989), in which the form was reduced from 25 to 10 items. The shortened version of the BIF has been used in previous research (e.g. Slepian, Masicampo & Ambady, 2015). Items were deleted to decrease the survey length and to make the survey more accessible by deleting items with words that can confuse non-native English readers (e.g. cavity/ballot). In the BIF, respondents are exposed to 10 behaviors each containing two descriptions differing in abstractness. They are tasked to choose the behavioral description that best suits their preference. Each behavior has a relatively concrete and a relatively abstract description. Each concrete answer is then coded as -1 and each abstract answer is coded as +1. After completing the task the construal level score is the sum of the scores for all 10 items. The effectiveness of the construal level manipulation is then checked by examining if the average scores of the abstract word-generation task treatment are significantly higher than the concrete word-generation treatment. To check if the word-generation task was completed as intended, two separate researchers judged the answers given on the word-generation task. The instruction for the task can be found in Appendix A.

Results and discussion. With regards to pretest 1.2, a lot of the respondents commented that the exercise was too hard and/or time-consuming, which also lead to respondents quitting the survey. To reduce the probability that a large percentage of the respondents will quit the main experiment during the construal level manipulation, it was decided not to use this manipulation. Instead, pretest 2 was conducted to examine a shorter construal level manipulation. Furthermore, for this small sample (N=18), the manipulation was unsuccessful. The mean of the high-level manipulation ($M = -1.64$, $SD = 4.72$), was not significantly higher than the mean of low-level manipulation ($M = -1.71$, $SD = 5.71$), $F(1,16) = .001$, $p = .975$.

Pretest 1.3. Finally, respondents (N = 19) were tasked to rate the options used for the phone case simulation in terms of sustainability with a 5-point Likert scale ranging from 1 (*very unsustainable*) to 5 (*very sustainable*). Several paired t-tests were conducted to see if the options were significantly different.

Results and discussion. The perceived sustainability scores were reasonably normally distributed. For the material of the phone case, bamboo was, as expected, perceived as the most sustainable material ($M = 4.42$, $SD = .69$), followed by leather ($M = 3.00$, $SD = 1.00$), silicon ($M = 2.68$, $SD = 1.06$), and plastic ($M = 2$, $SD = .75$) respectively. Almost all

differences were significant ($p < 0.05$), the only non-significant difference was between silicon and leather; $t(18) = -.922$, $p = .369$.

For screen protectors, the liquid screen protector made from bio materials was perceived as most sustainable ($M = 4.26$, $SD = .65$), followed by tempered glass ($M = 3.16$, $SD = .90$) and plastic ($M = 1.79$, $SD = .90$). All differences were significant ($p < 0.001$).

As expected, the delivery option that was perceived as most sustainable was the delivery using electric cars ($M = 4.11$, $SD = .81$). After, standard delivery was perceived as most sustainable ($M = 2.63$, $SD = .76$), followed by express delivery ($M = 1.89$, $SD = .74$). The differences between all 3 pairs were significant ($p < 0.001$).

In terms of packaging, the use of no product packaging and delivered in a box made out of recycled carton ($M = 3.21$, $SD = .787$) was perceived as significantly more sustainable ($p < .005$) as the product wrapped in plastic and delivered in a carton box ($M = 1.84$, $SD = 1.068$).

Concludingly, for all of the components with a sustainable choice, the option that is intended as the sustainable option, is also perceived as such. Therefore, these options are appropriate for use in the main experiment.

Table 4

Perceived Sustainability of the Options

Component	Option	Mean ^a	SD
Material	Plastic	2.00	.745
	Silicon	2.68	1.057
	Leather	3.00	1
	Bamboo (Eco-choice)	4.42	.692
Screen protector	Plastic screen protector	1.79	.855
	Tempered glass screen protector	3.16	.898
	Liquid screen protector made from bio-materials	4.26	.653
Delivery	Standard delivery, ordered before 16:00, delivered the next day	2.63	.761
	Express delivery, ordered before 16:00, delivered the same day	1.89	.737
	Eco-choice: ordered before 16:00, delivered in 3-5 days using electric cars to reduce emissions	4.11	.809
Packaging	Standard packaging: Product wrapped in plastic, delivered in a carton box	1.84	1.068

^aMeans range from 1 (*very unsustainable*) to 5 (*very sustainable*)

Pretest 2. A second pretest was conducted to examine the effectiveness of another method to manipulate construal levels. This method works by asking participants as to *why* they engage in a certain action to induce the high-level construal and asking as to *how* they perform a certain action to induce a low-level construal (e.g. Freitas, Gollwitzer, & Trope, 2004; Gong & Medelin 2012). Participants that got the high-level construal manipulation were asked to consider *why* they maintain and improve their health. The exercise required the respondents to indicate why they improve and maintain their health for three consecutive times, generating increasingly abstract thoughts. Participants who got the low-level construal manipulation had to consider *how* they would maintain and improve their health. The exercise tasked participants to state how they wish to improve and maintain health for three successive times, to generate more concrete thoughts. Unlike the manipulation examined in pretest 1.2 in which respondents had to repeat the task for four words, this manipulation had only one task and should thus lead to a lower number of respondents quitting the survey. An illustration of the exercise, which was also shown to the participants, can be found in Appendix B. The manipulation check was the shortened BIF, identical to the manipulation check that was used in pretest 1.2 (Appendix A).

Results and discussion. After deleting incomplete surveys, a total of 29 participants (17 men and 12 women) completed the survey. The results of the BIF were coded into +1 for tasks related to high-level construal and -1 for tasks related to the low-level construal. A new variable was computed with the total score. A One-way ANOVA was conducted to check for significant differences between groups (low-level construal vs. high-level construal). The dependent variable (total score for BIF) is metric and the groups (high-level vs. low-level) is nominal). Skewness (0.52) and kurtosis (-1.303) are within the recommended range of +1.96 and -1.96 (Hair et al. 2014). Levene's test is not significant, $F(1, 27) = 2.581$, $p = .120$, thus the assumptions for normality and equal variances of groups are met.

There was a significant effect of the construal level manipulation on the total score for the BIF, $F(1,27) = 4.257$, $p = .049$. The high level manipulation lead to higher total BIF scores ($M = 1.73$, $SD = 7.16$) than the low level manipulation ($M = -3.00$, $SD = 4.88$). The construal level manipulation worked as intended and was implemented in the survey for the main experiment.

Main Experiment

In the main experiment, the impact of the lateral display position and the moderating effect of the construal level were tested using a 2 (lateral position of the sustainable option:

left vs. right) x 2 (construal level: high vs. low) between-subject design. Participants were divided into groups corresponding to the 4 treatments illustrated in table 5. The lateral position of the options was arranged as follows: For group 1 and 3 the sustainable options for the components material, screen protector, delivery method, delivery service, and packaging were displayed on the left relative to the unsustainable options, and for group 2 and 4 vice versa. Group 1 and 2 were primed to think in a low construal level with *how* thought exercise tested in pretest 2, and group 3 and 4 were primed to the high construal level thinking with the *why* thought exercise.

Table 5

Treatments of The Main Experiment

		Display position sustainable option	
		Left (SL)	Right (SR)
Construal-level	Low (LC)	Group 1	Group 2
	High (HC)	Group 3	Group 4

This research has 3 variables, the dependent variable is the sustainable score that respondents had regarding the components that include a sustainable option (Material, screen protector, delivery method, delivery service, and packaging). Since there were five components with a sustainable option, the number of choices for the sustainable option was summed as a measure of the dependent variable. The independent variable was the lateral position in which the options were displayed (Sustainable option on the right vs. left). The final variable was the moderator of the construal level (high vs. low). The construal level was manipulated before the customers were exposed to the product customization page of the survey.

Potential effects of the left-side bias effect and the effects of the gaze starting point were ruled out by Romero and Biswas (2016), and therefore not considered in this research. The survey was translated into Dutch to increase the reach and accessibility to the main demographics. The linguistic validity was ensured using a back-translation by a representative of the target group (23-year-old Dutch master student). The back translation did not lead to major changes (see Appendix D), but some small adjustments were made to the survey (indicated in green).

Data Analysis Procedure

The data analysis starts with a general examination of the data. After, the groups are compared to see if there are any significant differences. The statistical technique ANOVA will be used since the dependent variable is metric and the experiment contains multiple groups (Field, 2013). The dependent variable was the choice (Sustainable or Unsustainable). The number of times participants choose a sustainable option was summed to compute a metric dependent variable called 'Total Sust. score' since there were multiple components that contained a sustainable option. The independent variable is the four different groups and the variable is categorical. The scales used for the covariates were examined using factor analysis.

Limitations and Research Ethics

The online experiment is conducted using survey software and does not include a real product configuration page. Even though the survey is made to look as real as possible, it is still a limitation. The participants were recruited using convenience sampling and were mostly Dutch students, thus the generalizability should be questioned. The price component of the product was not included given its complex influences. However, some of the choices with a sustainable option had different tradeoffs to increase realism (e.g. eco-friendly delivery takes longer).

The experiment is completely voluntary, and all participants can stop the experiment at any time and remain anonymous. The participants will not be informed on the goal of the experiment because it would influence the results. However, they can contact the researcher for any questions after the survey is closed for all participants. The e-mail of the researcher will be provided at the end of the survey. As for the results, the ethicality of nudges has been under question (see e.g. Sunstein, 2015; Hausman & Welch, 2010). Theoretically, the results could also provide insights on how to stimulate preference for any option, good or bad. However, the intentions of this research are in good faith and are not expected to be abused.

Results

Participants

The participants for the sample were recruited by convenience sampling, the URL of the survey was spread using Facebook, WhatsApp, Online forums, Survey share initiatives, and personal networking. The incentives for participating were the chance to win a voucher. In total 236 respondents fully completed the survey. After inspection, eight respondents were

deleted for incorrectly completing the manipulation exercise. The manipulation was likely ineffective for participants that took a long time to complete the survey. Therefore, 15 respondents with a very high duration of 3 times the median (400 seconds) were excluded from the analysis. Also, 5 respondents were deleted with extremely low durations (<180 seconds), making it unlikely that they filled the survey thoroughly. After deletion, the final sample used for analysis is 208, which is sufficient given the minimum of 20 per group recommended by Hair et al. (2014). Half of the participants were Dutch, and the other half was spread over different countries such as most notably; Germany (17) and Poland (15). The sample consists of 145 women (69.7%) and 63 men (30.3%) and includes mostly Master (60.6%) and Bachelor students (26.9%). The age ranges from 17 to 52 ($M \approx 25$) with a large percentage of the participants in the 21-26 range (76.8%). To gain a closer look at the groups, table 6 illustrates the demographics for the 4 groups.

Table 6

Demographics per Group

	<i>Group 1</i> <i>(LC/SL)</i>	<i>Group 2</i> <i>(LC/SR)</i>	<i>Group 3</i> <i>(HC/SL)</i>	<i>Group 4</i> <i>(HC/SR)</i>	<i>Total</i>	<i>Cumulative</i> <i>%</i>
N	52	55	51	50	208	100
Gender						
<i>Male</i>	18	13	17	15	63	69.7
<i>Female</i>	34	42	34	35	145	30.3
Nationality						
<i>Dutch</i>	21	32	26	25	104	50
<i>Other</i>	31	23	25	25	104	50
Dominant hand						
<i>Left</i>	11	2	4	11	28	13.5
<i>Right</i>	41	53	47	39	180	86.5
Education						
<i>Applied</i>	3	3	5	3	16	7.7
<i>Bachelor</i>	17	17	14	8	56	26.9
<i>Master</i>	29	30	29	38	126	60.6
<i>Doctorate</i>	2	2	0	0	4	1.9
<i>Other</i>	1	1	3	1	6	2.9
Age						
<i>Mean</i>	24.58	24.40	24.59	25.46		
<i>Median</i>	23	24	24	24		
<i>Range</i>	17-41	21-52	20-45	19-52		

Note. LC=low construal, HC=High construal, SR= sustainable right, SL= Sustainable left

Factor Analysis

All items from the scales Product involvement and Consciousness for Sustainable Consumption are put into a factor analysis to confirm that the structure of the actual scales is found. The CfSC scale uses the same items twice for two different statements, which might lead to a better fit of splitting the scale into two factors. An exploratory factor analysis was conducted to explore the number of factors to extract.

The items have a normal distribution, all items have skewness and kurtosis within the recommended range of +1.96 and -1.96. The KMO (= .880) and Bartlett's test ($p < 0.001$) indicates that the data is appropriate for factor analysis. Based on the latent root criterion (Eigenvalue's > 1), the initial extraction gives two factors that explain 69% of the variance. All communalities are sufficient (> 0.4). Given the low correlation between factors (< 0.3), an orthogonal rotation was justified (Varimax). A rotated matrix was extracted using Principal axis factoring, since the scales measure latent constructs. The rotated matrix distinguishes two factors, of which all communalities and loadings are acceptable. As expected, the items in the factors correspond to the items for the scales Consciousness for Sustainable Consumption (Factor 1), and Product involvement (Factor 2), see table 7 for an overview. The factor score of the CfSC scale was saved as a variable (regression) to include as a covariate.

Additionally, a reliability analysis was conducted to examine the internal consistency of the scales for CfSC and product involvement. The scale CfSC has an excellent reliability ($\alpha = .957$), but the scale for product involvement is only approaching sufficient reliability ($\alpha = .686$). The deletion of an item would not increase the Cronbach's alpha. Since the scale is adapted from a scale that has been validated and is largely used in previous literature (Zaichkowsky, 1985), it was decided to keep it for analysis.

Table 7

Overview of Factor Analyses

Scale	Item	Factor loadings ^a	
Environmental Consciousness for Sustainable Consumption ($\alpha = .957$)	I buy a product only if I believe it...	1	2
	...is made from recycled materials.	.825	.252
	...can be disposed of in an environmentally friendly manner.	.881	.846
	... is packed in an environmentally friendly manner.	.862	.213
	... is produced in an environmentally friendly manner.		
	How important is it for you personally that a product...		
	...is made from recycled materials.	.820	
	...can be disposed of in an environmentally friendly manner.	.862	
	... is packed in an environmentally friendly manner.	.844	
	... is produced in an environmentally friendly manner.	.860	
Product involvement ($\alpha = .686$)	I would be interested in reading information about phone cases.	.656	.
	I have compared product characteristics among brands of phone cases.	.579	
	I think there are a great deal of differences among brands of phone cases.	.540	
	I have a most preferred brand of phone cases.	.238	.554

^aOnly factor loadings $>.2$ are reported

Manipulation Check

To check if the construal level manipulation was successful, a manipulation check similar to pretest 2 was used. The answers for the BIF were coded into +1 for the abstract description and -1 for the concrete description. A new variable was computed which summed the scores for each respondent. A One-way ANOVA was conducted to check for significant differences between manipulations (low-level construal vs. high-level construal).

The Skewness (= -.351) and Kurtosis (= -.204) are within the recommended range of -1.96 and +1.96. Furthermore, Levene's test is not significant, $F(1, 206) = .587$, $p = .445$, thus the assumptions for normality and equal variances of groups are met and the data is appropriate for ANOVA. The group with the low-level construal manipulation ($M=1.79$, SD

= 4.47) was not significantly lower than the high-level construal manipulation ($M = 1.78$, $SD = 4.88$), indicating that the construal level manipulation was unsuccessful, $F(1,206) = .000$, $p = .985$.

Unfortunately, this makes it difficult to test the hypothesis regarding the effects of the construal levels. However, the distinction between the 4 groups was still used for the main analyses, since the respondents from every group received a different survey and the manipulation could still influence the choices.

Hypothesis Testing

In this section, the hypotheses are tested. The paragraph is structured per hypothesis, starting with the first hypothesis: “*putting the sustainable options on the right (vs. left) relative to the unsustainable options enhances (decreases) the preference for the sustainable options*”.

In order to compare the sustainable choices between groups, a new variable was computed (*Sust. Score total*) that summed the number of times a participant chose for the sustainable option. Additionally, the total score was split into two separate variables based on a somewhat logical categorization of the components to allow for more refined analysis. The first one *Sust. Score 1* sums the score for the first two component (Material and Screen protector), and the second variable *Sust. Score 2*, sums the score for the last three options (Delivery method, delivery service, and packaging).

These variables were used to test the first hypothesis that the choice for the sustainable option is enhanced when it is put on the right side (vs. the left). The dependent variable is the total sustainable score mean and is measured on a continuous scale. The more refined subscales are measured on an ordinal scale. The independent variable is the 4 groups and is categorical.

Independence of observations was assured by random assignment to treatments. Outliers for the dependent variable were considered as valid given the low ranges of the sustainable scores (max 1-5).

The Skewness and Kurtosis of all the dependent variables are within the recommended range of +1.96 and -1.96, and the Q-Q plots look normal. The Levene’s test is non-significant for all 3 independent variables (Appendix E).

The MANOVA indicates that there are no significant differences between the 4 groups for *Sust. Score 1*, $F(3, 204) = .514$, $p = .673$, for the *Sust. Score 2*, $F(3, 204) = .1792$, $p = .150$, and for *Sust. Score total*, $F(3, 204) = .955$, $p = .415$.

In order to test the first hypothesis and compare the groups with the sustainable option on the left (group 1 and 3) vs. on the right (group 2 and 4), a planned comparison was used by adding a special contrast to the MANOVA (-1,1,-1,1). The contrasts tests indicated that there are no significant differences between the groups with the sustainable option the left vs. the right for the *Sust. Score 1*, $F(1,204) = 1.479$ $p = .225$, for *Sust. Score 2*, $F(1,204) = .046$, $p = .831$, and for *Sust. Score total*, $F(1,204) = .280$, $p = .597$. See table 8 for an overview of the choices per treatment (left vs. right).

Table 8

Overview of Sustainable Scores

	Sustainable left		Sustainable right	
	(Group 1+3)	%	(Group 2+4)	%
<i>N</i>	103		105	
<i>Material</i>				
Plastic	15	14.6	18	17.1
Leather	23	22.3	24	22.9
Silicon	30	29.1	19	18.1
Bamboo	35	34	44	41.9
<i>Screen protector</i>				
Plastic	4	3.9	6	2.9
Tempered glass	59	57.3	53	50.5
Liquid	40	38.8	46	43.8
Total Sust. score 1	75		90	
<i>Delivery Method</i>				
Home delivery	65	63.1	59	56.2
Pick up point	38	36.9	46	43.8
<i>Delivery Service</i>				
Express delivery	7	6.8	16	15.2
Standard delivery	40	38.8	35	33.3
Eco delivery	58	56.3	54	51.4
<i>Packaging method</i>				
Plastic packaging	8	7.8	14	13.3
Eco Packaging	95	92.2	91	86.7
Total Sust. Score 2	191		191	
Total Sust. Score	266		281	

Note. Sustainable options are indicated in **bold**.

To control for other factors, an ANCOVA was conducted with the dependent variable *Total Sust. Score*, and three metric variables; CfSC (Factor scores from factor analyses), product involvement (averaged composited measure), and age added as covariates. Nationality, gender, dominant hand, current education, and the four groups were added as independent variables. To check for homogeneity of regression slopes, the interaction effect between the covariates and the independent variable was examined. A significant interaction effect was found between the CfSC factor scores and the independent variable, $F(4,195) = 26.059, p < .001$. Upon inspection, it seemed that the significant interaction effect was found because of the high values for group 4 for both variables. It appears that since group 4 had the highest average sustainable scores, the participants were influenced to report higher rates for the CfSC. In other words, choosing for the sustainable option made participants feel like they were more conscious about sustainable consumption. Given the interaction effect, the CfSC scale was left out of the model. The interaction effects between the covariates Product involvement, $F(4,195) = 2.177, p = .073$ and age, $F(4,195) = .662, p = .619$ and the independent variable were insignificant and therefore used as covariates in the main model.

Levene's test for the ANCOVA is non-significant, $F(60,147) = 1.120, p = .288$, indicating equal variances between groups. The ANCOVA finds a non-significant effect for the 4 groups, $F(3,195) = .736, p = 0.516$, indicating that there are no significant differences between the groups for the total sustainable score. The special contrast results find a non-significant result for the groups with the sustainable option on the left vs. groups with the sustainable option on the right, $F(1,195) = .203, p = .653$. All variables except for nationality are non-significant ($p > 0.05$), as illustrated in table 9. A MANCOVA with all 3 dependent variables did not lead to any significant differences. Furthermore, rerunning the ANCOVA with only "nationality" as a control factor, adding the CfSC as a covariate, or splitting the groups based on nationality does not lead to different conclusions. Therefore, the lateral placement of the sustainable option does not significantly increase the preference for sustainable options, and H_1 is rejected.

Table 9

Test of Between-Subject Effects (Total Sust. Score)

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Groups	4.265	3	1.422	.763	.516	.012
Nationality	12.452	1	12.452	6.681	.010	.033
Gender	6.418	1	6.418	3.444	.065	.017
Dominant_hand	.349	1	.349	.187	.666	.001
Education	13.586	4	3.396	1.822	.126	.036
Age	2.623	1	2.623	1.407	.237	.007
ProductInv.	1.317	1	1.317	.707	.402	.004
Corrected Model	45.050 ^a	12	3.754	2.014	.025	.110
Intercept	58.925	1	58.925	31.615	.000	.140
Error	363.445	195	1.864			
Total	1847.000	208				
Corrected Total	408.495	207				

^a R Squared = .803 (Adjusted R Squared = .790)

The second hypothesis: “*A low-level (high-level) construal moderates (enhances) the effects the lateral display nudge*”, was hard to examine given the unsuccessful manipulation. However, the construal-level manipulation might have worked for a short time period during the configuration phase, and diminished during the manipulation check. An ANOVA was conducted to test the interaction effect between the lateral placement of the sustainable option (left vs. right) and the construal level (low vs. high). Levene’s test is non-significant, $F(3,204) = 1.996$, $p = .116$. The results indicate a non-significant interaction effect, $F(1,204) = .590$, $p = .443$.

An alternative view is that the manipulation did not work but the manipulation check did, still allowing for distinction between construal levels based on the manipulation check. This approach was examined by computing a new variable of construal level (high vs. low) based on the manipulation check. Participants with a BIF score of 6 or greater were coded to a high construal group (N=51), and participants with BIF score of -2 or lower were coded to the low-level construal group (N=50).

Levene’s test is non-significant, $F(3,97) = 1.302$, $p = .278$. The ANOVA with the interaction between the lateral placement and the new variable for construal groups is also non-significant, $F(3,97) = .233$, $p = .873$, thus rejecting H_{2a} that the construal level moderates the effects of lateral placement.

Hypothesis 2b and 2c were tested by splitting the dataset based on the lateral placement (left vs. right) and handedness (left vs. right).

Hypothesis 2b: When the construal level is high (low), and people are right-handed, it enhances (moderates) choice for the sustainable option when it is positioned on the right.

The effect of the construal level (high vs. low) on choice for the sustainable option was tested for right handed participants that had the treatment with the sustainable option right. An ANOVA was conducted to test for significant differences. Levene's test is non-significant, $F(1,90) = 2.587$, $p = .111$. The analysis found a non-significant effect, $F(1,90) = 3.713$, $p = .057$ between group 2 (SR/LC, $M = 2.45$, $SD = 1.56$) and group 4 (SR/HC, $M = 3.05$, $SD = 1.33$) for right-handed people.

Alternatively, the effect is examined with the construal groups based on the construal levels of the manipulation check. Levene's test indicates equal variances between groups, $F(1,47) = .011$, $p = .916$. The effect remains insignificant, $F(1,47) = .554$, $p = .460$, indicating that the construal levels do not significantly influence choice preferences for right-handed people with the sustainable option on the right, thus rejecting H_{2b} .

Hypothesis 2c: When the construal level is high (low), and people are left-handed, it enhances (moderates) choice for the sustainable option when it is positioned on the left

The sample size for left handed people with the sustainable option on the left is too small ($n=15$) to draw conclusions. However, an ANOVA (Levene's test is insignificant, $F(1,13) = .577$, $p = .4610$) indicates that differences between group 1 ($M = 3.36$, $SD = 1.21$) and group 3 ($M = 2.25$, $SD = 1.50$), are insignificant, $F(1,13) = 2.221$, $p = .160$.

Alternatively, the effect is examined with the construal groups based on the construal levels of the manipulation check. Levene's test = $F(1,5) = .2916$, $p = .148$. The effect remains insignificant, $F(1,5) = 1.882$, $p = .224$, indicating that H_{2c} would be rejected.

The results do indicate some effects of handedness, looking purely at the interaction effect between dominant hand and lateral placement. For the left-handed participants, the mean sustainable score was higher for the treatments with the sustainable option on the left ($M = 3.07$, $SD = .36$) relative to treatments with the sustainable option on the right ($M = 2.46$, $SD = .39$). And for the right-handed participants the mean sustainable score was higher for treatment with the sustainable option on the right ($M = 2.71$, $SD = .15$) compared to

treatments with the sustainable option on the left ($M = 2.50$, $SD = .15$). However, the interaction effect is non-significant, $F(1,204) = 2.010$, $p = .158$.

Discussion

The aim of this research was to examine the potential of the lateral display nudge to stimulate sustainable consumption. This potential was examined by conducting an experiment that simulated a mass configuration website in which customers could design their own phone case. The results indicated, contrary to the hypothesis, that the lateral display nudge did not stimulate sustainable consumption nor have an influence on the choice of the participants. Thus, to answer the research question, it seems that the lateral display nudge is not effective in stimulation sustainable consumption in a mass customization context. As to why the nudge did not have any influence, it is hard to tell. It was expected that participants mentally organize the sustainable option on the right side based on mental representations. More specifically, based on the SNARC effect it was hypothesized that consumers perceive sustainable products as more expensive and longer lasting, mentally representing the sustainable option on the right side. However, some perceptions that tend more to the left side of the spectrum can be imagined as well (e.g. the sustainable option causes less environmental pollution, thus tending to the left), potentially canceling out a clear lateral tendency on the mental number line. Furthermore, the spatial representation of time was used to build on the hypothesis that the sustainable option is placed on the right side, given the relation of sustainability with a future orientation. However, one might argue that the non-sustainable option will be bad for the future, making the perception of which option is associated with the future less clear. Additionally, the hypothesis was based on the fairly binary view of sustainable vs. unsustainable options. In reality, the options are not only distinctive in terms of sustainability, but in many more dimensions. Each dimension potentially has its own mental representations which could counter or stimulate the mental representations elicited by the sustainable dimension. Concludingly, the mental processes involved in these decisions are complicated and hard to predict, let alone measure. This makes it hard to pinpoint why the lateral display nudge was ineffective.

The phone case configuration included five choices with a sustainable option. The design of multiple choices with a sustainable option was chosen to stimulate the visibility of any influences of the lateral placement and to lower the chance that any found result was caused by external factors. Ironically, it might have diminished the effects of the lateral placements by making the mental representations to complex, since each option could trigger

different mental representations based on for example the image used or based on the description. The lateral display nudge used by Romero and Biswas (2016) was also examined in a controlled laboratory setting, which might lead to different results than an online simulation. The lateral display nudge might be more effective to stimulate sustainable consumption in a physical environment. Furthermore, in study 1b Romero and Biwas found a significant effect in a design which only examined one healthy vs. one unhealthy meal. Perhaps a very straightforward design with only one choice containing two options, which are clearly distinguishable in terms of sustainability, would be more effective to examine the very base assumption that the lateral display nudge can be adapted to stimulate sustainability.

With regards to the covariates and control variables, some interesting effects were found. The nationality of the participants had a significant effect on sustainable scores. The sustainable scores for non-Dutch participants were higher than Dutch respondents, uncovering potential underlying cultural differences related to sustainability, customization or the lateral display nudge. The lateral placement study from Romero and Biswas (2016) was conducted in the US, but the majority of the respondents of this study were Dutch. This could have led to different results, which is supported by the positive interaction effect.

Alternatively, differences could have arisen due to the method of the collection of respondents. While Dutch participants were often recruited via personal circles, the non-Dutch participants were mostly recruited via the internet. This could differentiate the groups in terms of involvement, which might have influenced their answers. Furthermore, the Dutch participants conducted the survey in Dutch, leading to potential differences. However, since a back-translation was conducted and the product configuration had relatively little text, the effect was unlikely to be caused by the differences in survey language.

Another interesting finding was the interaction between the independent variable and the CfSC scale, the sustainable scores follow a similar trend the CfSC scores for the four groups. The differences are not caused by the construal level manipulation, and it is unlikely that the differences for the CfSC scores were caused by the lateral placements of the sustainable options. It seems that the interaction was not caused by the independent variable but by the dependent variable, the sustainable scores. The number of times a respondent chose a sustainable option influenced subsequent self-rated perceptions of sustainable consumption. It might have been related to expressive considerations, in which individuals express green values to conform with their idealized self-image (Sunstein & Reisch, 2014). Acting in congruence with their idealized self-image could have caused overly-optimistic self-

perceptions of consciousness for sustainable consumption, thus leading to an interaction effect.

A moderating effect was expected of the participant's construal levels on the effectiveness of the lateral display nudge. Unfortunately, the manipulation check indicated that the manipulation was unsuccessful, deeming it impossible to examine the effects of construal levels. This result could have multiple explanations. The first one is that the chosen construal level manipulation was ineffective. This can potentially be explained by the difference in the research setting. While the manipulation used by Gong and Medelin (2012) was filled on a paper questionnaire, the online survey used in this survey could be filled virtually everywhere in any situation, making it more likely that participants got distracted during the completion of the manipulation. Secondly, the manipulation could have been effective but not long lasting enough to lead to significant differences in the manipulation task after the fairly long phone case configuration phase. Alternatively, the configuration phase could have been too distracting, diminishing the effects of the manipulation. Finally, the manipulation check might have been invalid. This could have been caused by the research setting, or by the fact that the shortened version of the BIF from Vallacher and Wegner (1989) was used, which only used 10 of the original 25 items.

Following the body-specificity hypothesis, differences were expected depending on the dominant hand of the participants. Looking solely at the interaction between handedness and lateral placement, the findings indicate some differences but these are non-significant. As for the hypothesis interaction effect with construal levels, no conclusions can be made given the low sample size for left-handed participants per group.

Theoretical and Managerial Implications

Theoretical implications. The results of this research provide several theoretical contributions. Firstly, it builds on the research investigating the sustainability potential of nudges in a mass customization context, introduced by Hankammer et al. (2018b). The lateral placement of the options did not have any significant influence on the subsequent choices. This finding indicates that the lateral display nudge might not be adaptable to stimulate sustainability, specifically in an online mass customization context.

Secondly, the effectiveness of the construal level manipulation that was used in this research is questioned. In the manipulation, participants had to indicate how they wish to maintain and improve their health to induce a low-level construal and indicate why they wish to maintain and improve their health to induce a high-level construal. Despite being used in

previous research, the manipulation did not lead to significant differences in the manipulation check. Alternatively, it could have been the result of an invalid manipulation check. This research used a shortened version of the manipulation check by Vallacher and Wegner (1989) which only contained 10 of the original 25 items, and might not be suitable to measure construal levels. Furthermore, the manipulation and manipulation check might be better suited for more controlled research settings, where the participants are less likely to be distracted.

Contrary to the findings by Hankammer et al. (2018b), the results do not indicate that individual sustainability attitudes influenced sustainable choices. However, an interaction effect was between the different groups and answers on the CfSC scale. These findings indicate that consumers who engage in sustainable consumption have a heightened self-perception of their CfSC. This is possibly related to the expressive considerations of individuals when making a choice, in which individuals perform a certain action to conform with their idealized self-image. Theoretically, this could mean that sustainable consumption could heighten the CfSC of individuals and vice versa.

Another interaction effect, between the sustainable scores and nationality, indicates that cultural differences may arise for the lateral display nudge, or for research related to mass customization and/or sustainability. The results indicate that respondents from the Netherlands choose significantly less sustainable options than respondents from other countries. While this result can potentially be explained by limitations in the respondent collection, it still emphasizes the need to account for nationality in sustainable consumption research in a mass customization context, especially so when dealing with inhabitants from the Netherlands.

Managerial implications. The main experiment did not find the hypothesized results, thus restricting the practical insights. For policymakers or marketers of online mass customization companies that want to stimulate sustainable consumption, it is recommended not to implement the lateral display nudge in the product configurators. Instead, using other forms of nudges, such as the default nudges examined by Hankammer et al. (2018b), will likely yield better results. On a more abstract level, it is still fair to assume that the lateral position of the options can influence choices. Therefore, it is recommended for marketers to experiment with different positions for choices. Apart from the influences of the lateral position found by Romero and Biswas (2016), distinctions should also be made between horizontal and vertical displays. This is supported by research on shelf positioning (e.g. Chandon, Hutchinson, Bradlow, & Young, 2009; Valenzuela, Raghurir, & Mitakakis, 2013)

and effects of display structure on assortment processing (e.g. Deng, Kahn, Unnava, & Lee, 2016).

The most interesting practical insight perhaps comes from the unexpected finding related to the Consciousness for Sustainable Consumption scale. In the discussion, it was theorized that respondents who chose the sustainable options reported a CfSC for sustainable consumption because the expression of choosing a sustainable option made them feel closer to their idealized self-image. If this result is combined with the finding of Hankammer et al. (2018b) that customers with a high CfSC customize products with lower environmental impacts, a new nudge can be speculated. If the solution space is structured in such a way that for the first component of the product configuration the customers have a high chance of picking the sustainable option, for example by making it the default option or by making it the most attractive (e.g. lowering price), this should subsequently higher the CfSC of the customer. The higher CfSC should, in turn, lead to a higher chance that the customers pick the remaining sustainable options over their non-sustainable variants. However, this is largely speculation and requires future research.

Lastly, the interaction effect with nationality implies that it can be important to differentiate between nationalities for marketing strategies or public policies regarding sustainable consumptions. However, future research is needed to pinpoint the underlying explanation for the interaction effect, as it remains rather inconclusive.

Limitations and Future Directions

The research had several limitations, the biggest one being that the experiment was based on a simulation of a mass customization website selling customizable phone cases, instead of a real online website. All the images and components of the phone case that were used in the research were created for the purpose of the experiment. However, the images that were used the configuration steps were based on existing phone case design sites, thus resembling a realistic setting. The price dimension was not considered for this research because it would likely have a big influence on choices, making it hard to examine the effects of the lateral display nudge. However, in a real situation price is a big factor that might have its own interactions with the nudge. Further research could examine the effects of the nudge in a real setting by cooperating with an existing online customization website, which is able to change the lateral display positions of their product(s).

Another limitation is that no effort was made to measure mental representations or other key factors of the lateral display nudge. For example, participants could have been

asked if they perceive sustainable products as more expensive or longer lasting, or if they associate sustainable options with the future. Furthermore, an attempt could have been made to measure the processing fluency of respondents. With this information, it might have been easier to pinpoint why the lateral display nudge was unsuccessful.

Also, an online design was chosen with multiple sustainable options. To enable comparison, the main dependent variable was the total number of times a participant chooses the sustainable option. A sum variable like this has the problem that it does not differentiate between each choice and assumes that all choices have equal weight. Furthermore, participants could have been subject to order effects (e.g. Levav, Heitmann, Herrmann, & Iyengar, 2010). Also, the sustainable options contained an eco-label to emphasize its sustainable nature, and to strengthen mental representations for the sustainable options on the right, as supported by pretest 1.1. However, eco-labeling in itself can be used as a green nudge (Schubert, 2017) and might, therefore, have influenced the results. Furthermore, the eco-choice label greatly increases the chance that participants engage in hypothesis guessing. It is not unreasonable to assume that participants saw the eco-choice label and imagined that the research was related to sustainability, triggering responses such as blindly picking the sustainable options or refusing to pick the sustainable options, hurting the validity of the results either way. Furthermore, one of the components (delivery method) was added after the pretests were conducted. Therefore, it is unsure if the intended sustainable option is perceived as the most sustainable option. However, with the addition of the eco-label, it is unlikely that this was not the case.

While the product configurators have great potential to implement the lateral display nudge, preliminary research should be conducted to examine the very basic assumption that the lateral display nudge can be used to stimulate sustainable consumption. For example, a simpler research design that resembles the design used by Romero and Biswas (2016) could be used where a small number of options clearly distinctive in perceptions of sustainability are compared, in both an online and a controlled physical environment. If the effect can not be recreated using a simple research design, it is unlikely that the nudge can be implemented in product configurators. If the nudge can be replicated to stimulate sustainable consumption, future research could focus on examining the effects of the lateral display nudge in other product categories, since this research only examines one product category (phone cases). Perhaps future research should focus on electric goods, as recommended by Hankammer et al. (2018b).

The construal level manipulation did not lead to significant differences in the manipulation check. This implies that both the manipulation or the manipulation check could be flawed, restricting the insights from the results. For further research, it is recommended to use a different construal level manipulation. To measure construal levels in future research, it is recommended not to use the shortened version but to use all of the 25 items from the Behavioral Identification Form (Vallacher & Wegner, 1989).

Also, the effect of handedness was hypothesized. However, the sample size was insufficient for analyses. Further research should be done on the effects of handedness and its interactions with construal levels and the lateral display nudge. Moreover, the results indicate a difference between the sample that contained Dutch participants, relative to the other half of the participants that were a mixture of different countries. Therefore, the Netherlands might yield different results and the nudge should be examined with other population samples.

The lateral display nudge in this experiment was not effective. However, this does not mean that nudges do not have a place in mass customization models. The effectiveness of other nudges in product configurations should be examined. The proposed explanation of the interaction effect of the CfSC with sustainable scores should be examined. Does choosing for a sustainable option lead to a higher subsequent CfSC, and can this effect be used as new potential nudge as proposed in the practical implications? Future research could examine this effect by for example replicating the default nudge study used by Hankammer et al. (2018b), but by varying the first component. In different conditions, the first (or first few) components should have a high (vs. low) chance of picking the sustainable option which could carry over in a higher subsequent chance of choosing the sustainable options.

Additionally, out of the three categories of green nudges by Schubert (2017), the nudge that uses social comparison norms, in which people compare themselves to other, has not yet been examined in a mass customization context. This nudge shows promising results in sectors such as energy conservation (see e.g. Allcott, 2011; Handgraaf, de Jeude & Appelt, 2013), and in donation behavior (see e.g. Bartke, Friedl, Gelhaar & Reh, 2017). For example, an experiment could be conducted where the sustainable option contains some green social norms which could be descriptive, comparative, injunctive or even setting a commitment. An example of the use of a descriptive norm could be: “x percentage of the previous consumers choose for the sustainable option”. Future research is needed to further explore the potential of product configurators to stimulate sustainable consumption.

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Appendix A

Instructions for the BIF Manipulation Check (copied from Vallacher & Wegner, 1989)

Any behavior can be identified in many ways. For example, one person might describe a behavior as "typing a paper," while another might describe the behavior as "pushing keys", yet another person might describe the behavior as "expressing thoughts." I am interested in your personal preferences for how a number of different behaviors should be described. On the following pages you will find several different behaviors listed. After each behavior will be two choices of different ways in which the behavior might he identified.

Here is an example:

- 1. Attending class
 - a. Sitting in a chair
 - b. Looking at the blackboard

Your task is to choose the identification, a or b, that best describes the behavior for you. Of course, there are no right or wrong answers. People simply differ in their preferences for the different behavior descriptions, and I am interested in your personal preferences. Be sure to mark your choice for each behavior. Remember, choose the description that you personally believe is more appropriate in each pair.

Table A1

Shortened Version of the BIF Used in the Survey (Adapted from Vallacher & Wegner, 1989).

Item	Behavior	
	OR	
Picking an apple	Getting something to eat*	Pulling an apple off a branch
Locking a door	Putting a key in the lock	Securing the house*
Filling out a personality test	Answering questions	Revealing what you're like*
Greeting someone	Saying hello	Showing friendliness*
Taking a test	Showing one's knowledge*	Answering questions
Reading	Following lines of print	Gaining knowledge*
Washing clothes	Removing odors from clothes*	Putting clothes into the machine
Cleaning the house	Showing one's cleanliness*	Vacuuming the floor
Climbing a tree	Getting a good view*	Holding on to branches
Eating	Getting nutrition*	Chewing and swallowing

*abstract answer corresponding to high-level construal

Appendix B

Illustration of the Task Used for the Main Experiment, and Pretest 2

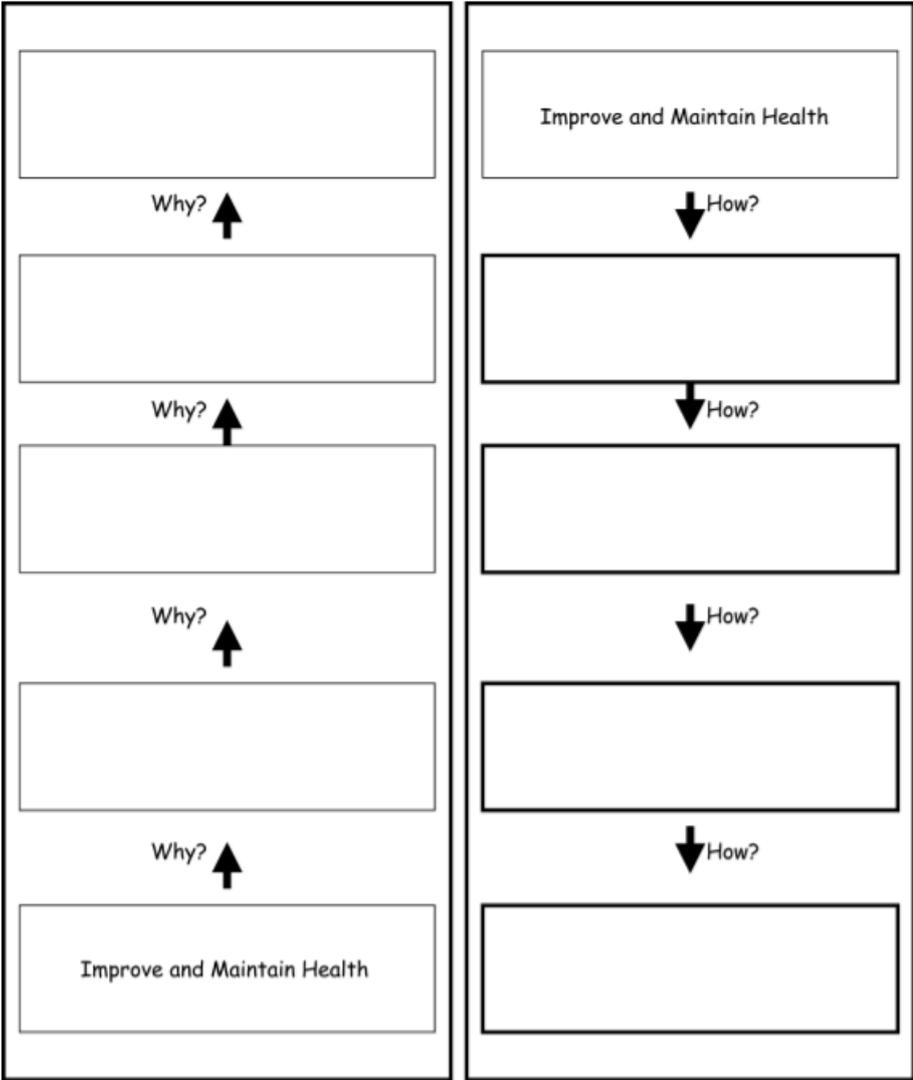


Figure B1. Illustration of the construal-level manipulation task (The why task on the left corresponds to the high-level construal manipulation and the how task on the right to the low-level construal manipulation).

Appendix C

The Survey Used for the Main Experiment.

Note. Information in grey illustrates the names and structure of the blocks, words in *italics* are the names of the questions only visible to the researcher and ----- indicates a new question.

Start of Block: Default Question Block

Intro

To change the language to Dutch, look at your top right.

Welcome,

Thank you for participating!

This survey is part of my master thesis, and consists of several tasks and an interactive simulation in which you can design your own phone case!

The survey will start with a few basic questions and a thought exercise. After, you will be able to design your phone case, and the survey will close with one more task and a few statements.

The total survey should take around 10 minutes.

By continuing you give consent to participate in the research. However, participation is completely voluntary and all data will be treated anonymously.

In the end of the survey you can leave your e-mail to have a chance to win a 50 euro gift coupon (Store negotiable).

Once again, thank you for participating in my survey

Dion Jurissen

End of Block: Default Question Block

Start of Block: *constru low**Constru l intro*

For everything we do, there always is a process of **how** we do it.

Moreover, we often can follow our broad life-goals down to our very specific behaviors.

For example, you probably hope to find happiness in life.

How can you do this? Perhaps finding a good job, or being educated, can help.

How can you do these things? Perhaps by earning a college degree.

How do you earn a college degree? By passing all courses.

How do you pass all courses? By properly studying for all the courses.

This thought exercise is intended to focus your attention on **how** you do the things you do.

For this thought exercise, please consider the following activity: ‘improving and maintaining one’s health.’

Page -----

Break

Constru low example

In this exercise you are asked how you want to improve and maintain your health. After each answer, you have to indicate how you plan on doing this.

For example,

Q1 How do you want to improve and maintain your health?

-> *By swimming regularly.*

Q2 Would then be: How are you swim regularly?

-> *By getting a subscription to the local swimming pool.*

Q3 Would then be: How do you get a subscription to your local swimming pool?

There are 4 how questions in total.

Please answer the questions one by one. The figure below illustrates the process.

constru low picture (see Appendix B)

Q1 how

Q1. How do you want to improve and maintain your health?

Q2 how

Q2. How?

Q3 how

Q3. How?

Q4 how

Q4. How?

End of Block: *constru low*

Start of Block: *constru high*

Constru high intro

For everything we do, there always is a reason **why** we do it. Moreover, we often can trace the causes of our behavior back to broad life-goals that we have.

For example, you currently are participating in a survey. Why are you doing this? Perhaps to help someone out.

Why do you want to help other people? Perhaps because it makes you feel good. Why do you want to you feel good? Perhaps because you want to live a happy life.

This thought exercise is intended to focus your attention on **why** you do the things you do.

For the next thought exercise, please consider the following activity: ‘improving and maintaining one’s health.’

Page _____
Break

Constru intro

In this exercise you are asked why you want to improve and maintain you health. After each answer, you are asked to indicate why you want to do that.

For example,
Q1 Why do you want to improve and maintain your health? -> *To keep myself fit*

Q2 Would then be: Why do you want to keep yourself fit? -> *To feel good during the day*

Q3 Would then be: Why do you want to feel good during the day.

In total there are 4 Why questions.

The figure below illustrates the process.

Please answer the questions one by one, starting at the bottom of the page (Q1) and answering upwards ↑

Constru high pic (see Appendix B)

Q4 why

Q4. Why?

Q3 why

Q3. Why?

Q2 why

Q2. Why?

Q1 why

Q1. Why do you improve and maintain your health?

End of Block: constru high

Start of Block: Configurator beginning

Config intro

In this simulation, imagine that you are looking to protect your phone by purchasing a phone case and a screen protector.

While looking in the stores, you can't quite find the one you like.

Thus, you decide to go online and find a store that offers customizable phone cases.

You just found the (fictional) website www.designyourcase.com and are ready to start designing.....

 Step 1. Select your brand and model

Please select your phone brand by clicking on your brand in the image below.

Removed due to copyright considerations.

Model

Please type the model of your phone in the text box and our smart service will automatically find the right sizes.

End step1

The next step is to choose the type of case, the material, and a screen protector. Press the forward button →

End of Block: Configurator beginning

Start of Block: Material sust right

Step 2 R

Step 2. Choose the type of case, the material, and your screen protector.

Case type R

Please select your case type by clicking on the image.

Removed due to copyright considerations.

Material R

Select your material.
(You can change the look in the design phase)

Removed due to copyright considerations.

Screen protector R

Select your screen protector

Removed due to copyright considerations.

Step2R end

To start designing, press the forward button →

End of Block: Material sust right

Start of Block: Material sust left

Step2 intro L

Step 2. Choose the type of case, the material, and your screen protector.

Case type L

Please select your case type by clicking on the image.

Removed due to copyright considerations.

Material L

Select your material.
(You can change the look in the design phase)

Removed due to copyright considerations.

Screen protector L

Select your screen protector.

Removed due to copyright considerations.

Step 2 end L

To start designing, press the forward button →

End of Block: Material sust left

Start of Block: Design

Step 3 intro

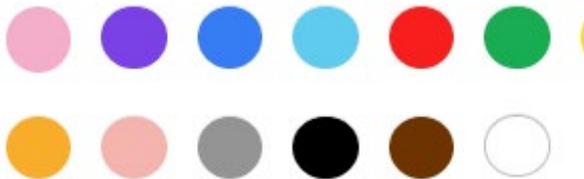
Step 3. Design and personalize your phone Case!

Choose your design method

- Choose from existing designs (1)
- Choose my own color and the possibility to add emoticon stickers (2)

Color

Select the color of your case!



Emoticon yes no

Do you want to add an emoticon sticker to your phone case?

- No (1)
- Yes (2)

Emoticonpic

Click the emoticon you want to add in the image below.

Removed due to copyright considerations.

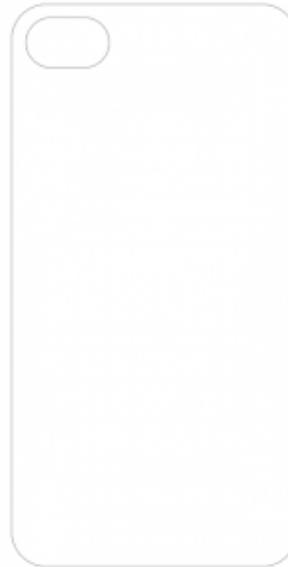
Sticker size

Select the size of your sticker

- Small (1)
- Medium (2)
- Large (3)

Sticker phonetemplate

Where do you want the sticker to be?
Choose the position by clicking on the empty phone case below!



Designs

Please select your design

Removed due to copyright considerations.

Text yes no

Do you want to add text to your phone case?

- No (1)
 - Yes (18)
-

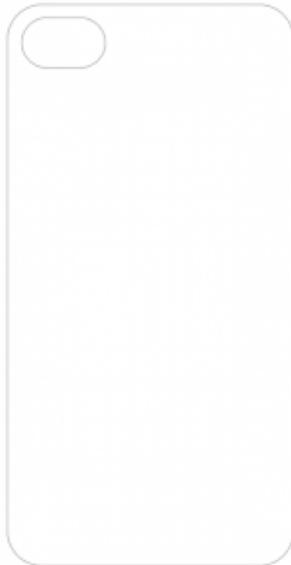
add text box

If u want to add text to your case, type it in the box below

Ttext position

Where do you want the text to be?

Choose the starting position of the text by clicking on the empty phone case below!

*Step 3 end*

The last step is to choose your delivery and packaging methods! Click the next arrow when you are ready →

End of Block: Design

Start of Block: Packaging, delivery method and service rechs

Delivery method R

Final step. Choose your delivery and packaging method.

Choose your delivery method

Removed due to copyright considerations.

Delivery service R

Please select your delivery service

Removed due to copyright considerations.

Packaging method R

Select your packaging method

Removed due to copyright considerations.

Step 4 end R

To complete your order, click the button →

End of Block: Packaging, delivery method and service rechs

Start of Block: Packaging, delivery method and service left

Step 4 delivery L

Final step. Choose your delivery and packaging method.

Choose your delivery method

Removed due to copyright considerations.

Delivery service L

Please select your delivery service

Removed due to copyright considerations.

Packaging method L

Select your preferred packaging method

Removed due to copyright considerations.

Step 4 end L

To complete your order, click the button →

End of Block: Packaging, delivery method and service left

Start of Block: End simulation

thank you simulation

Thank you for completing the design simulation, to finish off there is one last thought exercise followed by a few statements.

Note: The designs and images used were not created by me, but are from real phone case websites.

End of Block: End simulation

Start of Block: BIF form

Page _____

Break

Bif intro Any behavior can be identified in many ways. For example, one person

might describe a behavior as "typing a paper," while another might describe the behavior as "pushing keys", yet another person might describe the behavior as "expressing thoughts." I am interested in your personal preferences for how a number of different behaviors should be described. On the following pages you will find several different behaviors listed. After each behavior will be two choices of different ways in which the behavior might be identified.

Here is an example:

1. Attending class
 - a. Sitting in a chair
 - b. Looking at the blackboard.

Your task is to choose the identification, a or b, that best describes the behavior for you. Of course, there are no right or wrong answers. People simply differ in their preferences for the different behavior descriptions, and I am interested in your personal preferences. Be sure to mark your choice for each behavior. Remember, choose the description that you personally believe is more appropriate in each pair.

Bif 1 (1)

Picking an apple

- Getting something to eat (1)
 - Pulling an apple off a branch (2)
-

Bif 2 (2)

Locking a door

- Putting a key in the lock (1)
 - Securing the house (2)
-

Bif 3 (2)

Filling out a personality test

- Answering questions (1)
 - Revealing what you're like (2)
-

Bif 4 (2)

Greeting someone

- Saying hello (1)
 - Showing friendliness (2)
-

Bif 5 (1)

Taking a test

- Showing one's knowledge (1)
 - Answering questions (2)
-

Bif 6 (2)

Reading

- Following lines of print (1)
 - Gaining knowledge (2)
-

Bif 7 (1)

Washing clothes

- Removing odors from clothes (1)
 - Putting clothes into the machine (2)
-

Bif 8 (1)

Cleaning the house

- Showing one's cleanliness (1)
- Vacuuming the floor (2)

Bif 9 (1)

Climbing a tree

- Getting a good view (1)
 - Holding on to branches (2)
-

Bif 10 (1)

Eating

- Getting nutrition (1)
- Chewing and swallowing (2)

End of Block: BIF form**Start of Block: Material R***Material appealing R*

Which material did you find most aesthetically appealing?

Removed due to copyright considerations.**End of Block: Material R****Start of Block: Material appealing L***Material appealing L*

Which material did you find most aesthetically appealing?

Removed due to copyright considerations.**End of Block: Material appealing L**

Start of Block: Product involvement/CfSC

Product involv R

This is the last block of questions!

Read the statements carefully

	Strongly disagree (15)	Disagree (16)	Somewhat disagree (17)	Neither agree nor disagree (18)	Somewhat agree (19)	Agree (20)
I would be interested in reading information about phone cases. (1)						
I have compared product characteristics among brands of phone cases. (26)						
I think there are a great deal of differences among brands of phone cases. (27)						
I have a most preferred brand of phone cases. (28)						

CfSC2

How important is it for you personally that a product...

	Not at all important (29)	Slightly important (30)	Moderately important (31)	Very important (32)	Extremely important (33)
...is made from recycled materials. (1)					
...can be disposed of in an environmentally friendly manner. (2)					
... is packed in an environmentally friendly manner. (3)					
... is produced in an environmentally friendly manner. (4)					

End of Block: Product involvement/CfSC

Start of Block: Demographics

Gender

Gender

- Man (1)
- Woman (2)

Prefer not to disclose (11)

CfSC1

I buy a product only if I believe it....

	Strongly disagree (22)	Disagree (23)	Somewhat disagree (24)	Neither agree nor disagree (25)	Somewhat agree (26)	Agree (27)	Strongly agree (28)
...is made from recycled materials. (1)							
...can be disposed of in an environmentally friendly manner. (2)							
... is packed in an environmentally friendly manner. (3)							
... is produced in an environmentally friendly manner. (4)							

Age

What is your age?

Dominant hand

What is your dominant hand?

- Left (1)
- Right (2)

Page
Break

Nationality

What is your nationality?

- Dutch (1)
 - Other: (4)
-
-

End of Block: Demographics

Start of Block: End

End message

This is the end of my survey, thank you for your participation!

Education

Current education

- High school (26)
 - Applied education (32)
 - Bachelor (27)
 - Master (28)
 - Doctorate (31)
 - Other (33)
-

If you want to have a chance to win the 50 euro voucher, or if u would like to get to know the results of the survey, leave your email in the text box below (not mandatory).

- Sign me up for a chance to win a 50 euro gift card! (4)
- I would like to receive information of the results of the research (5)
- Both (6)

Appendix D

Back Translation of the Survey (Text used to make adjustments indicated in green)

Experiment

Welcome,

Thank you for your participation

This survey is part of my master thesis, and consists of several tasks and an interactive simulation where you can design your own phone case!

This survey starts with a few basic questions and a thinking exercise. After that it is possible to design your own phone case, and the survey will close with one final task and a few statements.

The duration of the survey will be between 10 and 15 minutes.

By continuing you give consent to participate in the research. However, participation is completely voluntary and all data will be collected and held anonymously.

At the end of the survey you can leave your e-mail to have a chance to earn a gift card worth 50 euros (Store T.B.A.)

Om de taal naar het nederlands te veranderen, zie rechtsboven

Once again, thank you for participating in my survey,

Dion Jeurissen,

With everything we do, there is a certain process of **how** we do it.

Furthermore, we can often derive our lifegoals down to a very specific behavior.

For example, like most people, you probably wish to lead a happy life.

How do you achieve this? It may help to find a good job, or follow an educational programme.

How are you able to do this? Maybe by attaining a university degree.

How do you achieve an university degree?
By passing all the courses.

How do you pass all the courses? By properly studying for all the exams. This exercise is meant to draw your attention to **how** you do things. Consider the following activity for your next exercise: “Improving and maintaining ones health”.

In this following exercise you are asked how you want to improve and maintain

your health. Clarify how you are planning to do this after every answer.

For example:

Q1 How do you want to improve and maintain your health?

➔ By swimming regularly

Q2 Would then be: **How are you planning** to swim regularly?

➔ By getting a subscription to the swimming pool

Q3 Would then be: How do you get a subscription to the swimming pool?

There are 4 how questions in total.

Answer these questions one at a time. The following illustration explains the process.

Q1. How are you going to improve and maintain your health?

Q2. How?

For everything we do, there is a certain **reason** why we do it. Furthermore, we are often able to derive the causes of our behavior down to our lifegoals.

You are currently participating in this survey for example.

Why are you doing this? Maybe to help someone.

Why do you want to help other people? Maybe because it gives you a good feeling.

Why do you want to feel good? Maybe because you want to lead a happy life.

This exercise is meant to draw your attention to **why** you do the things you do.

Consider the following activity for the **next exercise**: 'Improving and maintaining your health'.

In this exercise you are asked why you want to improve and maintain your health. After every answer **you are asked to** clarify why **you want to do that**.

For example,

Q1 Why do you want to improve and maintain your health? -> to remain fit

Q2 Would then be: Why do you want to remain fit? -> to feel good during the day

Q3 Would then be: Why do you want to feel good during the day?

There are 4 Why questions in total

The following illustration explains the process.

Answer the questions one by one, start at the bottom of the page (Q1) and answer the questions from bottom to top.

Q2. Why?

Q1. Why do you want to improve and maintain your health?

For the following simulation, you have to imagine that you are looking to protect your phone by buying a phone case and a screen protector.

When you were browsing the stores, you were unable to find a product which you liked. So you decided to look online for a shop where you are able to customize your own phone case. You were able to find the (fictional) website www.designyourcase.com and are ready to start designing...

Step 1. Choose your brand and model

Select your phone brand by clicking on your brand in the image below.

Type in the model of your phone in the text box and your smart service will automatically find the correct measurements of your device.

The next step is to choose your type of case, the material, and a screen protector. Press the forward button →

Step 2. Choose the type of case, the material, and your screen protector.

Select your type of case by clicking on the image.

Select the material.

(you can change the design in the design phase)

Select your screen protector.

To start the designing phase, click on the forward button →

Step 3. Design your phone case!

Choose your design-method

- Choose from existing designs
- Choose your own color and the possibility to add emoticon stickers

Do you want to add an emoticon sticker to your case?

- No
- Yes

Click on the emoticon you want to add in the image below

Select the size of your emoticon sticker

- Small
- Medium
- Large

Where do you want to add the sticker?

Choose the position by clicking on the empty phone case below!

Select your design

Do you want to add text to your phone case?

- No
- Yes

If you want to add text, type it in the box below

Where do you want to add the text?

Choose the starting position by clicking on the empty case below

The last step is to choose your form of delivery and packaging method! Click on next if you are ready →

The last step. Choose your delivery and packaging method

Choose your delivery method

Select your **packaging method**

To complete your order, click on the button →

Thank you for completing the design simulation, to finish off there is one last thinking exercise followed **by a few statements**.

Note: **The designs and images where not created by me**, but are from real online phone case stores.

Every behavior can be described in many ways. A person can for example describe a behavior as ‘typing a paper’, while another person would describe the same behavior as ‘pressing buttons’, where yet another person would possibly describe it as ‘expressing thoughts’.

I am interested in your personal preferences for how certain behaviors should be described.

Here is an example: 1. Attending a class

- a. Sitting in a chair. B. looking at the blackboard

Your task is to choose the identification, a or b, that best describe the behavior for you. There are no correct or wrong answers. People differ regarding their preferences and I am interested in your personal preference.

Picking an apple

- Getting something to eat
- Picking an apple from a branch

Locking a door

- Inserting a key in the lock
- Securing the house

Doing a personality test

- Answering questions
- Discovering who you are

Greeting someone

- Saying hello
- Showing friendliness

Making an exam

- Showing your knowledge
- Answering questions

reading

- Following lines of text
- Gaining knowledge

Washing clothes

- Removing odor from clothes
- Putting clothes in the washing machine

Cleaning the house

- Showing your cleanliness
- Vacuuming the floor

Climbing a tree

- Getting a good view
- To hold on to branches

Eating

- Getting nutrition
- Chewing and swallowing

Read the statements carefully

This is the last block of questions!

I am interested in reading information about phone cases.

I have compared product characteristics among brands of phone cases

I think there are a lot of differences among brands of phone cases

I have a preferred brand for phone cases

I choose a product only if I believe it..

Is made from recycled material

Can be disposed in an environmentally friendly way

Is packaged in an environmentally friendly way

Is produced in an environmentally friendly way

How important is it to you that a product...

Is made from recycled material

Can be disposed in an environmentally friendly way

Is packaged in an environmentally friendly way

Is produced in an environmentally friendly way

Gender

- Male
- Female
- Prefer not to disclose it

What is your age

What is your dominant hand

- Left
- Right

What is your nationality

- Dutch
- Other..

Current education

- High school
- HBO
- Bachelor
- Master

- Doctorate
- Other

This is the end of my survey, thank you for your participation.

If you want to have a chance to win a 50 euro coupon, or if you are interested in the results of my research, leave your email in the text box below (not mandatory).

- Sign me up for a chance to win a 50 euro gift coupon!
- I want to receive information regarding the results of the research
- Both

Email:

.....

Appendix E

Statistics Used for the First Hypothesis

Table D1

Skewness and Kurtosis of Dependent Variables

	Skewness	Kurtosis
Score Total	.027	-.899
Score 1	.372	-1.216
Score 2	-.180	-.942

Table D2

Levene's Test for Dependent Variable Including Subscales

	Levene Statistic	df1	df2	Sig.
Total Sust.Score	1.996	3	204	.116
Sust. Score 1	.841	3	204	.473
Sust. Score 2	2.188	3	204	.091

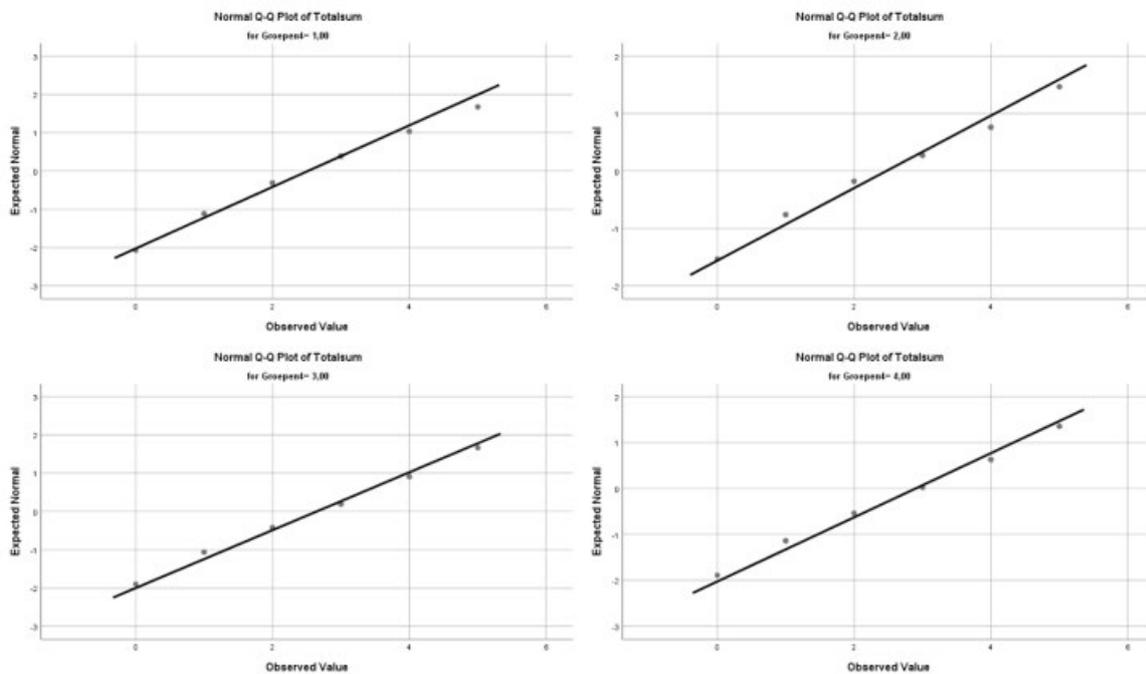


Figure D1. Q-Q plots for the sustainable scores per group

