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# Using Visual and Linguistic Framing to Support Sustainable Decisions in an Online Store

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## Abstract

Companies face several digital communication challenges when it comes to promoting green products or services. The framing effect, which refers to the presentation of information, can significantly influence decision-making in digital interfaces. This research explores the impact of information framing through text and visuals on purchase decisions for sustainable fashion products. An online evaluation study ( $N = 84$ ) of an e-commerce environment was conducted. We found that visual framing significantly affected user product choices, supporting more sustainability decisions. In contrast, little evidence was found that supported the effectiveness of linguistic (i.e., message) framing on user product choices. We discuss implications on how product pages should be designed to encourage sustainable decision-making.

## Keywords

Framing, Persuasion, Digital Interfaces, Decision-making, Sustainability

## 1. Introduction

Promoting green consumption is key to meeting ambitious sustainable fashion targets being set around the world [1]. However, it is often difficult for companies to design communication strategies that increase consumers' willingness to choose these products [2]. Encouraging environmentally conscious consumption is crucial in achieving the sustainable goals that are being established worldwide (e.g., in the fashion industry) [1]. Social marketers have investigated several different ways to encourage consumers to engage in sustainable behavior [3].

A common strategy is to make use of framing strategies. The framing effect refers to the influence of decision and attitudes by the way information is presented [4]. When it comes to promotion sustainable decision-making, research has shown that using "green" message framing is effective in engaging people with sustainable consumption behavior and could lead to greater levels of sustainable consumption of behavior being adopted [1].

Different framing strategies have shown to be effective. Framing can take place by using linguistic and/or visual communication. A common linguistic strategy is through message framing. By providing linguistic alterations of information, attitudes and decisions can be influenced [4].

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Providing information in a well-defined and lucid manner can greatly influence how products are evaluated [5]. How information is presented plays a vital role in promoting sustainable attitudes and purchasing eco-friendly products [6]. A message frame that is frequently used is the abstract-concrete frame. Providing concrete claims about sustainability, such as ‘vegan’, ‘produced in Europe’, etc., can provide benefits through specific, helpful information. This is opposed to abstract claims such as ‘green’, ‘eco-friendly’, and ‘environmentally conscious’, that imply benefits through the use of abstract information or language [7]. The use of concrete or abstract wording can therefore influence the (un)certainly that consumers have in the product description and thereby the product itself [8]. Hence, how linguistic information is framed can influence purchasing decision significantly [9] by enhancing consumers’ perceived value of being environmentally conscious and increasing their trust in environmentally friendly products [10]. In a digital interface, such explanations can support user trust [11].

Framing through visual communication commonly takes place through infographics. These refer to graphical illustrations that represent information or data [12] and have shown particularly effective when communicating about environmental issues and sustainability [13]. There is an increasing use of visuals (e.g., eco-labels) that are used alongside product presentations to easily indicate the sustainable consciousness of a product [14] and can increase the value of a product [15]. However, the influence in the decision-making process is relatively unknown.

In this work, we explore how message framing by using either abstract or concrete terms influences the decision-making for sustainable products as well visual framing through the use of (eco-)labels. We created a web-based experiment that simulated an e-commerce platform. Participants were asked to choose between six white T-shirts with different names (message framing) and icons (visual framing), among which four were indicated to be sustainable. Based on an exploratory study with 84 participants, we found that our message framing conditions did not significantly affect the decision-making process of the participants. In contrast, the use of visual framing did affect the user decision-making process, also increasing the number of sustainable products chosen. With this work we provide insights into the decision-making process of online sustainable products and how this could be affected or improved.

## 2. Research Questions

Framing information with clear and specific details is important to effectively communicate a product’s environmental impact and to support decision making. We posit the following research questions:

**[RQ1]:** To what extent does message framing, through an abstract-concrete frame to communicate a product’s sustainability information, affect user product choices?

**[RQ2]:** To what extent does visual framing, in the form of using (eco-)labels to communicate a product’s sustainability information, affect user product choices?

## **3. Related Work**

### **3.1. Message Framing**

A common framing approach within marketing is message framing. This can take multiple forms, such as positive versus negative frames, self- versus other-focused, or abstract versus concrete [16]. The positive and negative frame is rooted in prospect theory [17]: Positive frames emphasize the potential gains of certain actions (e.g., “riding a bicycle helps to protect the environment”), while negative frames emphasize potential losses or consequences (e.g., “taking the car is harmful to the environment”).

The self- versus other-focused frame is connected to Construal Level Theory and relates to the psychological distance of the message [18]. The benefit of a self-focused frame is internally driven (e.g., “You can be proud of yourself that you took the bicycle”), whereas a other-focused frame is more distant and externally driven (e.g., “You comply to social norms that you took the bicycle”). According to construal level theory [18] the abstract frame consist of a more general and ambiguous message. For example, “You contribute to a greener environment by taking the bicycle”, where the environment is particularly abstract. A concrete frame on the other hand, consist of a more concrete and clear message (e.g., “By taking the bike you have reduced your carbon footprint by X percent”).

### **3.2. Visual Framing**

A method that is more focused on image representations of information is visual framing. This method is less obtrusive than using words, for it imposes less cognitive strain [19, 20]. Audiences may activate peripheral rather than central cognitive processing routes [18], which may be more likely to be accepted compared to linguistic framing methods [21]. Hence, in some circumstances, visual framing may be more effective than verbal framing. For instance, anecdotal evidence about the impact of the September 11 illustrates visual ‘flashbulb memories’, with people citing the adage “a picture speaks a thousand words” [22]. Visual cues have a high potential to produce visual framing effects given this unique logic of visual communication. Graphics rapidly establish a visual frame that is highly salient and barely questioned by recipients through their associative logic, powerfully influencing how they understand textual information by activating concrete cognitive patterns [23].

Eco-labels are graphic representations intended to designate items that have a favorable environmental and social impact [24]. It can convey a significant message to a consumer about the product. Standardized labels can help to minimize doubt and ambiguity regarding the authenticity of eco-friendly purchases made by consumers [25]. Furthermore, eco-labels serve as a means of policy implementation by conveying details about a product’s sustainable features [26]. As a result, the visual aspects, written content (if applicable), and color scheme of eco-labels are designed to confirm the product’s sustainability significance.

## 4. Method

We developed an e-commerce environment to investigate the influence of visual and linguistic framing on sustainable decision-making. We created six similar products with different visual and linguistic descriptions that signal the (non-)sustainability of the product. See Fig. 2 for an overview of the different product conditions, which were shown on a single page. The effects of the two framing methods for sustainable products were examined on the four left-hand shirts in the interface, while the two non-sustainable products were included as dummies to indicate user preferences between sustainable and non-sustainable alternatives.

The study's procedure was initiated by collecting demographics. Afterwards, participants were presented the following scenario:

You are invited to a gathering with friends. The theme of the gathering involves wearing a simple white T-shirt. You got a recommendation to buy the T-shirt at [a fictitious brand website on the next page]

Participants were then redirected to interact with the e-commerce environment (see Fig. 2), of which the order was randomized. Participants were asked to select the product they would like to buy.



(a) Sustainability visuals representing recycled cotton (left) and fair trade (right)

(b) Non-sustainability visual representing a trending product

**Figure 1:** Close-up of the visual icons accompanying different t-shirts: (a) represents sustainable visual framing, (b) the non-sustainable baseline.

The visuals that were created are based on generic representations of (non-)sustainability (see Fig. 1). We additionally included a tooltip in the e-commerce environment to explain the meaning of the visuals. The linguistic variations that were used are based on the suggestions of Davis [7] who distinguished linguistic strategies for environmental advertising based on the concreteness of terms that are used. Following this guideline, we used “eco-friendly” (see Fig. 2a and Fig. 2d) as our abstract term and “recycled cotton” (see Fig. 2b and Fig. 2e) as our concrete term to define the sustainability contributions of the product. We included two control conditions that do not depict any sustainability relation as a baseline: 1) visual that depicts that the product is trending with a vague description (see Fig. 2c), and 2) a concrete textual description without visuals (see Fig. 2f). Note that the addition of these two non-sustainable alternatives did not account for a full factorial design, as the combinations of visual-concrete and non-visual-abstract were missing for the non-sustainable alternatives. Yet, we compared both the effects on sustainable choices, as well as the effects within the sustainable options.

Several e-commerce websites were surveyed to determine a realistic price of the products in the study. Non-sustainable products tend to fall within a cheaper price range compared to sustainable products, with sustainable products seeing on average a 30% surcharge. Therefore,



Eco-friendly T-shirt  
Product code: 001



S M L XL 2XL

27,20 €

VAT included

Free delivery



(a) Sustainable with visuals and abstract terms



T-shirt from recycled cotton  
Product code: 005



S M L XL 2XL

27,20 €

VAT included

Free delivery



(b) Sustainable with visuals and concrete terms



T-shirt  
Product code: 006



S M L XL 2XL

20,90 €

VAT included

Free delivery



(c) Non-sustainable with visuals & abstract terms



Eco-friendly T-shirt  
Product code: 004



S M L XL 2XL

27,20 €

VAT included

Free delivery



(d) Sustainable with abstract terms



T-shirt from recycled cotton  
Product code: 003



S M L XL 2XL

27,20 €

VAT included

Free delivery



(e) Sustainable with concrete terms



Fashionable plain T-shirt  
Product code: 002

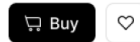


S M L XL 2XL

20,90 €

VAT included

Free delivery



(f) Non-sustainable with concrete terms

**Figure 2:** Screenshot of the product variations. Denoted are the different framing conditions.

we determined a price of €20.90 for non-sustainable products and €27.20 for the sustainable variations.

Participants (55.95% female) were recruited through snowball sampling, among which 84 fully

completed the study. Most participants ( $n = 62$ ) were between 18 and 34 years old age range, while other age groups comprised fewer participants (35-54,  $n = 12$ ; 55-75,  $n = 8$ ; 75+,  $n = 2$ ). All participants indicated to feel at least some degree of importance in buying sustainable products.

## 5. Results

Table 1 describes the frequencies for different T-shirt choices. On average, only 61.9% of participants ( $n = 52$ ) chose a sustainable T-shirt, compared to a base rate of 66.67% (i.e., 4 out of 6 shirts were sustainable), suggesting non-sustainable alternatives were on average preferred over sustainable t-shirts. This suggested that the slightly higher price of sustainable alternatives negated the possible advantages of their sustainability, as communicated through the two framing strategies. Moreover, any significant changes in the proportion of sustainable choices were relative to this slightly lower base rate.

Across both sustainable and non-sustainable alternatives, 69.1% of participants ( $n = 58$ ) selected a T-shirt that was subject to visual framing. Moreover, 59.5% of participants ( $n = 50$ ) selected a shirt with concrete language. Considering sustainable alternatives only, 19 participants selected a shirt with an abstract description (compared to  $n = 33$  for concrete). Based on these frequencies, visual framing seemed to have had a slightly larger impact on user choices than linguistic framing.

**Table 1**

Frequencies of T-shirts variations selected by participants.

<b>T-shirt variation</b>	<b>Count</b>	<b>Percentage</b>
<b>Sustainable w/ visuals &amp; abstract terms (Fig. 2a)</b>	13	15.48%
<b>Sustainable w/ visuals &amp; concrete terms (Fig. 2b)</b>	28	33.33%
<b>Non-sustainable w/ visuals &amp; abstract terms (Fig. 2c)</b>	17	20.24%
<b>Sustainable w/ abstract terms (Fig. 2d)</b>	6	7.14%
<b>Sustainable w/ concrete terms (Fig. 2e)</b>	5	5.95%
<b>Non-sustainable w/ concrete terms (Fig. 2f)</b>	15	17.86%
<b>Total</b>	<b>84</b>	<b>100%</b>

To statistically investigate the influence of visual and linguistic framing on sustainable decision-making, we conducted two chi-square tests. First, we examined the influence of message framing on a participant's shirt selection (see Table 2). Our first chi-square test showed that there was no significant association between linguistic variations and the sustainability of a chosen T-shirt:  $\chi^2(3, 84) = 45, p = 0.21$ . This suggested that the use of abstract or concrete sustainability information did not lead to more sustainable choices, even though t-shirts were slightly more likely to be selected when using abstract terms in their name.

Second, we examined whether visual framing affected the sustainability of chosen products. Our results showed that there was a significant difference in user choices for (non-)sustainable T-shirts between those that were presented with a visual frame and those that were not:  $\chi^2(3, 84) = 17.07, p < 0.001$ , showing that the likelihood a sustainable T-shirt was chosen increased if it was presented with a visual icon. This suggested that visualized sustainability information could be effective for interface designers to support sustainable purchases.

**Table 2**

Observed and expected frequencies of product choice by participants based on T-shirts consisting of linguistic variations (i.e., abstract or concrete) and whether they are sustainable. Observed values are presented with expected values within parentheses.

<b>Observed (vs expected) frequencies</b>	<b>Abstract terms</b>	<b>Concrete terms</b>	<b>Total</b>
<b>Sustainable T-shirts</b>	33 (28)	19 (28)	52
<b>Non-sustainable T-shirts</b>	17 (14)	15 (14)	32
<b>Total</b>	50	34	84

**Table 3**

Observed and expected frequencies of product choice by participants based on T-shirt variations consisting of accompanying visuals and whether they are sustainable. Observed values are presented with expected values within parentheses.

<b>Observed (vs expected) frequencies</b>	<b>Visuals</b>	<b>No visuals</b>	<b>Total</b>
<b>Sustainable T-shirts</b>	41 (28)	11 (28)	52
<b>Non-sustainable T-shirts</b>	17 (14)	15 (14)	32
<b>Total</b>	58	26	84

We also examined whether our framing strategies affected user choices across sustainable alternatives only. Where the previous analyses faced an incomplete factorial design (see Discussion), we used a chi-squared test on the 2x2 design of sustainable shirts, assessing the impact of the visual and linguistic framing strategies. It revealed that the two strategies significantly impacted user choices for sustainable shirts:  $\chi^2(3, 52) = 26.00, p < 0.001$ . Upon inspecting the frequencies, it seemed that a concrete sustainable name with visuals was the most popular ( $n = 28$ ), while a more abstract name with visuals followed the expected frequency of  $n = 13$ . In contrast, the non-visual alternatives were less popular ( $n = 5$  for concrete,  $n = 6$  for abstract). This suggested that visual strategies were also most effective among sustainable alternatives, particularly when combined with concrete terms.

## 6. Discussion

We have explored the impact of linguistic (i.e., message) and visual framing of product information on sustainable fashion choices. We have set up an e-commerce environment with white T-shirts that were visually similar, but which were framed differently. Besides four sustainable options, we have also added two non-sustainable alternatives that were slightly cheaper. We have examined whether sustainable choice are supported through these framing methods, and how they affect preferences among sustainable options.

Our study reveals little evidence for the effectiveness of an abstract-concrete message frame. While this has not boosted the number of sustainable choices, it has emerged that a concrete description is more effective when combined with a visual frame. In contrast, the use of visual framing has yielded a significant increase in the number of sustainable alternatives selected. Moreover, among the set of sustainable options, products that have been presented



with additional visual labels are chosen more frequently than products without any label.

Our findings align with previous research that emphasizes the importance of using visuals to enhance information processing. For example, Blanco et al. [27] demonstrates that combining product images with schematic information improves perceptions of information quality in product presentations. It is important to note that their study focused on online product presentations and did not specifically investigate sustainability presentations. Similarly, Lazard and Atkinson [13] show that infographics contributes to higher levels of elaboration compared to solely text-based messages.

The only effect found for the linguistic framing was that a concrete description could be preferred among sustainable options. This would align with construal level theory [28, 18], as concrete descriptions align better with people acting 'now', rather than in the future. Hence, in such an e-commerce scenario, choosing a sustainable alternative in favor of a non-sustainable one might be an action with a relatively low behavioral threshold.

Building on our results and the existing research, it seems that the use of visual aids allows for easier cognitive processing. It has become evident that visuals play a significant role in effectively conveying sustainability-related information, also about fashion products online.

## 7. Limitations

One notable limitation of this study is the utilization of a fictitious scenario. This has involved a partially functional prototype website that offered T-shirts with identical styles. The absence of a real-world context and the limited variety of product options have probably influenced participants' decision-making process, potentially resulting in choices that deviate from what they would make in a marketplace with a diverse range of offerings. For example, it is unclear how competing products (e.g., in terms of style) with varying sustainability explanations would affect user choices.

Another important limitation is the lack of a full factorial design when comparing choices across sustainable and non-sustainable options. The two non-sustainable options were added for the realism of the task, but two additional combinations of framing and non-sustainability would have been required for a full comparison. Nonetheless, the *chi*<sup>2</sup> tests have still indicated whether an effect is present, while controlling for the base rate. Moreover, we have also analyzed the effectiveness among the four sustainable alternatives only.

A final limitation of our study is the reliance on self-reported sustainability consciousness. Participants' perceptions and awareness of their own sustainability practices may vary, which introduces subjectivity into the data. This subjectivity brings the possibility of social desirability bias, where participants may report their sustainability consciousness in a manner that aligns with societal expectations rather than their true beliefs and behaviors. As a result, the reported levels of sustainability consciousness may not accurately reflect participants' actual attitudes and behaviors. It is worth noting that some participants may prioritize trendiness over sustainability, indicating a potential discrepancy between stated preferences and actual purchasing decisions. Future research could consider employing additional measures to assess sustainability consciousness and explore the influence of social desirability bias on reported sustainability-related attitudes and behaviors.

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