

**The Effects of Visual Design on Eco-labels Evaluations:
Guidelines for Effective Green Advertising**

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Abstract

Through three survey designs using 15 real eco-labels we explored four design elements on consumers' attitude toward the eco-label logo, showing that visual complexity, text amount and green colour increased attitude toward the eco-label whereas conceptual complexity decreased it. Besides, the impact of conceptual complexity on conceptual fluency was positive only when the labels contained more text and predominantly green which resulted in no decrease in the attitude toward the eco-label. Moreover, while visual complexity was positively related to attitude toward the eco-label due to increased perceptual fluency, conceptual complexity was negatively related to it due to decreased conceptual fluency.

Keywords: Eco-labels, visual complexity, conceptual complexity, text amount, predominant colour, fluency, sustainable consumption

1. INTRODUCTION

As consumer' awareness and sensitivity about sustainability increase (Rustam et al., 2020; Sana, 2020; Casalegno et al., 2022), fast-moving consumer goods (FMCG) companies feel the pressure of signaling the sustainability in their products to their consumers effectively. In particular previous research (e.g., Bangsa & Schlegelmilch, 2020; Hosta & Zabkar, 2021) demonstrated that both environmental and social performance of products positively influence consumers' decision making, and therefore companies seek to take advantage of this trend by offering more responsible products and services (Fernando et al., 2019) using external certifications, as *eco-labels* (i.e., Sogn-Grundvåg et al., 2019).

Eco-labels can be defined as a marketing communication instrument, aimed at signaling to the consumers that a product has been produced in an environmentally sustainable manner (Atkinson & Rosenthal, 2014; Hansen & Kull, 1994). A growing number of products decided to certify their sustainable production using eco-labels (i.e., Horne, 2009; Sogn-Grundvåg et al., 2019), in fact, Ecolabel Index (2022) lists a total of 457 eco-labels present in 199 countries and 25 industries worldwide. However, it seems that eco-label design is not effective in communicating its sustainable meaning. For example, Grunert and colleagues (2014) noted that sometimes even environmentally concerned consumers could find difficult to understand the signaling value of an eco-label. According to Usrey et al. (2020), green product information needs to be clear and meaningful to support consumer evaluations, and given the signaling role of eco-labels (Atkinson & Rosenthal, 2014), there is need to understand how consumers evaluate their logo design elements. The relevance of eco-label format on consumer evaluations has been already recognized by previous research, for example Van Loo et al. (2015) found that the presence (vs. absence) of the eco-label (USDA) logo generates a higher willingness to buy the labeled product. Tang et al. (2004) investigated visual versus verbal communication cues of eco-labels on consumers' purchase intentions, while other eye-tracking studies focused on how eco-labels can favorite consumers' visual attention (Guyader et al., 2017; Drexler et al., 2018; Rihn et al., 2019; Song et al., 2019).

However, previous research did not clarify what are the visual design elements that are more likely to affect consumers' evaluations toward the eco-labels. In that sense, Donato and Adigüzel (2022) have recently investigated the effect of eco-labels' visual complexity on consumers' product evaluations. In particular, the authors distinguished between feature and design complexity (Pieters et al., 2010), and using an experimental approach found that both types of complexity positively affect labelled products evaluations through perceptual fluency. However, the visual design elements referring to an eco-label might be related not only to perceptual fluency (i.e., how easy it is to identify a given stimuli), but also to conceptual fluency (i.e., how easy it is to understand the meaning of the stimulus). Actually, easy understandability is even more important in effectiveness of eco-labels, as eco-label noticeability on product package does not ensure its effectiveness if consumers are not able to understand its meaning.

Besides the ability of an eco-label to evoke a consensual meaning (i.e., conceptual complexity, Perussia, 1988) there are other two elements that are used to help consumers to identify eco-labels' function, namely its colour and its textual information.

For example, looking at these two eco-labels, we can note that they are characterized not only by different visual elements and different meaning, but also by different colours and textual information that help consumers to understand sustainable production process involved in the specific product (i.e., organic agriculture and sustainable fishing, respectively).



Therefore, the objective of the present research is to identify the impact of all these elements on consumers' evaluations in order to provide guidelines for an effective eco-label design. Moreover, we explain the relationships between the analyzed eco-labels visual design elements on consumer evaluations through processing fluency theory.

Related to the visual design components of eco-labels, we mainly referred on research related to design complexity and logo evaluations (Henderson & Cote, 1998; Miceli et al., 2014) as eco-labels have a structure similar to brand logos, such as small scale dimensions, reduced use of colours, and meaning-based associations. In line with Miceli et al. (2014)'s research, we distinguish between two sub-dimensions of eco-label design complexity, namely visual (i.e., visual information featured by an eco-label) and conceptual complexity (i.e., meanings evoked by an eco-label). However, despite the apparent similarities between brand logos and eco-labels, there are some elements of these latter that strongly differentiate them from brand logos, as their function, the presence of textual information, and colours. Related to the function, while brand logos have the objective to help consumers to identify a specific firm from the competitors, eco-labels mainly signal the presence of a sustainable production process. Moreover, the text present in brand logos is generally associated to a brand or to the industry descriptor, differently the textual information present in eco-label logos (i.e., full sponsor organization name or abbreviation, explicit reference to "sustainable words" such as organic, sustainable...) are aimed at communicating the label meaning and to increase trust to the label. Additionally, brand logos can present several colours, whereas eco-labels are generally associated with "sustainable" colours such as green or blue. Consequently, differently from existing literature on logo design evaluation that mainly investigated unfamiliar brand logos without any colour and text (Henderson & Cote, 1998; Miceli et al., 2014; Van der Lans et al., 2009), we studied consumers' attitude toward real eco-labels differing in terms of visual and conceptual complexity, and additionally we considered the impact of text amount present on the eco-labels and their colour. Despite Henderson and Cote (1998) have already suggested the need of

further research in the logo design domain considering colour and text, so far no previous research has investigated these two effects jointly neither in logo nor in eco-label logo context.

Consequently, through a pre-test and three survey study design we considered visual complexity, conceptual complexity, textual amount and colour dimensions of a sample of 15 existing eco-labels available on FMCG Italian market and we tested their efficacy in terms of consumers' attitudes. Moreover, we tested if these effects were explained by fluency theory. Results show that consumers are more likely to prefer eco-labels that present a visually complex design, able to evoke a clear meaning, using green colour, and that present textual information. Moreover, we demonstrate that these effects can be explained with the mediating role of perceptual and conceptual fluency.

Our results contribute to both literatures on sustainability communication and on brand logo evaluation, as they represent the first attempt of systematic identification of the visual dimensions better perceived in the context of eco-labels. Moreover, since positive eco-label attitudes are likely to increase purchase intentions of eco-labeled products (e.g., D'Souza et al., 2007; Thøgersen, 2000), understanding the impact of eco-labels' design dimensions on consumers can help marketers to increase sustainable consumption behaviors in future.

2. LITERATURE REVIEW

2.1 Ecolabels design and consumer responses

Current research on eco-labelling and consumer behavior has demonstrated that they represent an important communication tool aimed at environmentally sensitive consumers (Grankvist et al., 2004; Thøgersen et al., 2010), and that their presence is commonly associated with positive consumer evaluations of the labeled product (Sörqvist et al., 2015) and higher willingness to pay for it (Michaud et al., 2013; Taufique et al., 2017; Khachatryan et al., 2021). Especially the presence of eco-labels positively influences food evaluation in FMCG industry, for example, taste evaluation

and willingness to pay were found to be high for eco-labeled coffee (Sörqvist et al., 2013), wine (Wiedmann et al., 2014) and yogurt and potato chips (Lotz et al., 2013).

Researchers pointed the low adoption of eco-labels in consumers' purchase decisions (Leire & Thidell, 2005; Meyerding & Merz, 2018; Song et al., 2019), and one of the main reasons of this low adoption can be attributed to the low awareness and understanding of eco-labels (e.g., Eldesouky et al., 2020; Annunziata et al., 2019). Delmas and Lessem (2017) found that consumers can even interpret eco-labeling as a signal of low quality, in fact according to their results consumers preferred eco-labeled wines only when the price was low and the wine came from a low-quality region; conversely, non-eco-labeled wines were preferred when they were more expensive and from a high-quality region. Given the low adoption of eco-labeled products, it is crucial defining guidelines able to help marketers and designer to define eco-labels easy to perceive and to understand, making them more likely to be selected during purchase decisions.

Previous findings underlined the importance of designing eco-labels able to provide meanings easy to interpret in order to promote eco-friendly consumption (Vlaeminck et al., 2014). In fact, Taufique et al., (2019) emphasized the importance of the *visual design*, namely the graphical appearance of eco-labels, which guarantees eco-labels to be noted by customers (Perrini et al., 2010) and at the same time to be understood. As a consequence, a well-designed eco-label can improve consumer recognition, avoiding confusion and positively affecting consumers' choice toward the labeled product (Testa et al., 2015).

Teisl et al. (2008) found that eco-labels' format and the amount of information presented next to eco-label logos influenced product greenness perceptions. Tang and colleagues (2004) found that both visual and verbal eco-labels communication affect consumers' purchasing behavior comparing products presented without eco-labels. Despite Janssen and Hamm (2012) concluded that consumers' greenness perceptions of products with organic eco-labels that have different designs is subjective in nature, Rihn et al. (2019) demonstrated that eco-label logos capture relatively more visual attention than textual elements.

In that sense Donato and Adıgüzel (2022) analyzed the effect of eco-labels' visual and design complexity on labelled products evaluations finding that consumers positively evaluated products labelled with eco-labels high in both design and feature complexity via processing fluency. However, the authors did not isolate textual information and colour cue in their analyses on eco-labels and did not consider their conceptual complexity. Although design elements of visual stimuli have been proven influencing attention, recognition and recall, liking, attitudes and consequently product evaluations in different contexts through processing fluency as brand logos (Janiszewski & Meyvis, 2001; Miceli et al., 2014), print advertising (Pieters et al., 2010), websites (Geissler et al., 2006), product packages (Orth & Malkewitz, 2012), products (Creusen et al., 2010) and interior service environments (Orth & Wirtz, 2014), to the best of our knowledge, our study is the first to examine how various design elements such as visual complexity, conceptual complexity, text amount and colour can affect consumers' evaluations of eco-labels.

2.2 Visual and Conceptual Complexity of Eco-labels

Previous research already underlined the importance of logo visual design in consumers' perceptions and evaluations (Henderson & Cote, 1998). Miceli et al. (2014) investigated the effects of logos complexity on consumers' evaluations, distinguishing between *visual* and *conceptual* complexity. *Visual complexity* is defined as the variety of visual information featured by a visual stimulus (Berlyne, 1970), whereas *conceptual complexity* is defined as the ability of a visual stimulus to evoke multiple meanings but not a consensually held one (Perussia, 1988). Then, a visual stimulus (i.e., a logo) can vary in terms of the variety of its visual elements and in terms of the meanings that these visual elements can communicate. Miceli et al. (2014) conducted a hybrid experimental study considering 140 black-and-white unfamiliar logos and found an initial positive effect of visual complexity on attitude toward the logo which becomes negative with multiple exposures, and an initial negative effect of conceptual complexity on attitude toward the logo which becomes positive as exposures increase. Moreover, across an extensive cross-national survey van der Lans et al. (2009) reported a positive effect of logo visual elaborateness on logo attitude, and

same results were confirmed by van Grinsven and Das (2016)'s experimental research, showing a positive relationship between consumers' attitude and visually complex logos. Additionally, Pieters, Wedel and Batra (2010) illustrated that consumers have favourable attitudes toward visually complex advertising and give more attention to them. Thus, the ability of visually complex stimuli to create arousal (Berlyne, 1970) and more information processing was proven to generate a high consumers' attitude toward the stimuli (Janiszewski & Meyvis, 2001). Similarly, we can expect that visually complex eco-labels, featuring different visual elements (e.g., curves, lines, shapes), are more likely to stimulate interest and arousal than visually no complex eco-labels. This higher interest and arousal, in turn, can lead to a higher consumers' attitude (aesthetical appreciation) toward eco-labels characterized by high (vs. low) visual complexity. Formally:

H₁: Visual complexity has a positive effect on attitude toward the eco-label.

The appreciation of a stimulus design is strongly correlated to the ability of the consumers to grab its meaning (Schnurr & Stokburger-Sauer, 2016). In that sense, previous research demonstrated that highly codable stimuli are perceived and interpreted more easily than stimuli that are low in codability (Perussia 1988; Lachman 1973), leading to a higher consumers' attitude. Therefore, visual stimuli characterized by a meaning easy (vs. difficult) to interpret are preferred by consumers (i.e., Miceli et al., 2014). The meanings conveyed by eco-labels should basically rely on sustainability, therefore on the basis of previous literature (Cornelissen et al., 2008) we can expect that consumers will show a higher attitude toward eco-labels characterized by a high codable (sustainability) meaning, and therefore toward those eco-labels presenting a low (vs. high) conceptual complexity. Formally:

H₂: Conceptual complexity has a negative effect on attitude toward the eco-label.

2.3 Eco-label Colour

Colour is an element frequently manipulated by eco-label designers in order to favour consumers recognitions and evaluations, with particular attention to *green* colour (Bottomley & Doyle, 2006; Seo & Scammon, 2017; Sundar & Kellaris, 2017; Lim et al., 2020) which seems to be the most commonly used colour for identifying eco-labels because of its conceptual assonance with environmental issues (Lichtenfeld et al., 2012; Clarke & Costall, 2008; Elliot & Maier, 2014). Seo and Scammon (2017) demonstrated that a brand with an environmental claim is considered environmentally superior when it comes with a green package; Sundar and Kellaris (2017) confirmed the same result considering brand logos, whereas Pancer et al., (2017) underlined the importance of the green colour and green claims in influencing consumers' eco-labels perceptions. Consequently, as a result of the implicit association of green colour with environmental sustainability, its presence in the eco-labels design will be more likely to increase consumers' attitude toward the eco-label. Formally:

H₃: Green colour has a positive effect on attitude toward the eco-label.

2.4 Eco-label Text Amount

Considering that the main function of eco-labels is to inform consumers about the sustainability of a particular product (Atkinson & Rosenthal, 2014), these green signals can be considered as a form of sustainable advertisement present on product package, and as such they are formed by a graphical part (i.e., the logo) and a textual part (e.g., label name, source and sometimes information about the label meaning). Indeed, eco-labels contain various textual information, namely sponsor organization abbreviation (e.g., J.A.S for the Japanese Agricultural Organic Standard eco-label), full name of organization (e.g., World Fair Trade Organization), fitted words with the label (e.g., organic, sustainable, eco, certified), website of organization (e.g., www.fsc.org) or date of establishment of organization (e.g., 1987 like in Rainforest Alliance eco-label). Then, it is necessary to consider both graphical and textual elements of eco-labels on consumers' evaluation.

As underlined by previous research (Rihn et al., 2019; Tang et al., 2004; Teisl et al., 2008) even if in less measure, also the textual part of eco-labels affects consumer perceptions.

Despite literature has largely demonstrated that visual communication (as images, logos) is more effective in terms of memorization and recall than verbal communications (Kaplan, Kaplan & Sampson, 1968; Lieberman & Culpepper, 1965), there are cases in which the classical “pictures dominance” is not confirmed. For example, written messages are more effective when consumers are highly motivated and capable of processing the semantic content of the message (Childers & Houston, 1984). According to Pieters et al. (2010) findings, consumers prefer printed advertisements in which the brand text is explicitly recognizable. Similarly, it is possible to expect that consumers prefer eco-labels containing textual information that favorites their recognition and therefore their green value. Moreover, Morgan et al. (2021) demonstrated that when consumers are familiar with a brand, they respond more favorably to image-based logos than to text-based logos. However, when less familiar, consumers prefer text-based logos over image-based logos. This finding is particularly relevant in the eco-label context, as consumers environmentally concerned are likely to be familiar with eco-labels, and textual information can reinforce their attitude toward the eco-labels, as it represents a warranty (i.e., credibility sign) for their sustainable choices. Conversely, for consumers not familiar with eco-labels the presence of textual information can provide a useful recognition signal, as it offers details about the eco-label meaning. In the present research we conceptualized textual information of eco-labels with *text amount*, namely the number of words presented together with the eco-label, assuming that the higher text amount the higher quantity of information given by the eco-label. Consequently, we propose that eco-labels presenting higher (vs. lower) text amount will be preferred in terms of consumers’ attitude, as they help consumers to elaborate the meaning associated to eco-labels. Formally:

H₄: Text amount has a positive effect on attitude toward the eco-label.

2.5 The mediating role of fluency

Previous research recognized the role of *fluency*, defined as the ease of elaboration of a stimulus (Reber et al., 2004) as the key mechanism in facilitating consumer processing of visual stimuli such as brands, logos, advertisements and even labels and CSR reports (Mauri et al., 2021; Invernizzi et al., 2021). In particular, it is possible to distinguish between two types of fluency: *perceptual fluency*, defined as the ease to elaborate the visual features of the stimulus (Jacoby et al., 1989; Bornstein & D'Agostino, 1992), and *conceptual fluency* defined as the ease to elaborate the meanings associated with the stimulus (Whittlesea, 1993; Shapiro, 1999).

Prior research converges on the idea that fluency can positively influence perceptions of attractiveness (Labroo et al., 2008) and consequently consumer evaluations (Brakus et al., 2014; Lee & Labroo, 2004), and their purchase intentions (Labroo & Lee, 2006), moreover, Miceli et al. (2014) demonstrated that the positive effect of visual complexity on logos evaluation is explained by perceptual fluency, whereas the negative effect of conceptual complexity on logos evaluation is explained by conceptual fluency. Similarly, it is possible to expect that the positive relationship between visual complexity (i.e., physical feature) and consumers' attitude toward eco-label logos is explained by perceptual fluency: the presence of multiple visual elements (e.g., curves, lines, shapes) generates pleasant metacognitive feelings in the consumer (Reber et al., 2004) that, in turn, positively affect consumers' attitudes. Formally:

H₅: Perceptual fluency explains the positive effect of visual complexity on attitude toward the eco-label.

Conversely, the negative relationship between conceptual complexity (i.e., semantic feature) and consumers' attitude toward eco-label logos is explained by conceptual fluency: Both studies on codability (e.g., Perussia, 1988) and on conceptual fluency (e.g., Schwarz & Clore, 1990) demonstrated that visual stimuli with a meaning easy to understand generate positive

metacognitions associated with fluent processing of the meaning, that in turn positively affect stimuli attitude. Similarly, eco-label logos with clear meanings are expected to be easier to interpret and therefore more liked, whereas eco-label logos with unclear meanings are less easy to interpret with consequent negative effect in terms of consumers' attitude. Formally:

H₆: Conceptual fluency explains the negative effect of conceptual complexity on attitude toward the eco-label.

As already noted, whereas perceptual fluency is influenced by the physical attributes of a stimulus including its surface features and presentation context (Lee & Labroo, 2004), conceptual fluency is related to meanings (Morgan et al., 2021). Another important eco-label element is related to its colour, with particular attention to the green one as able to affect consumers' eco-labels perceptions (Pancer et al., 2017). Donato & Adıgüzel (2022) underlined the wide presence of green colour in the eco-labels design given its implicit association with sustainable values (Lin & Chang, 2012; Labrecque et al., 2013; Seo & Scammon, 2017). Consequently, even if consumers are not familiar with a specific eco-label design, the green colour (if present) might facilitate the activation of a sustainable meaning. Then, eco-labels presenting green colour are elaborated easier, because of their implicit connection with environmental sustainability (i.e., Donato & Adıgüzel, 2022), and this ease of elaboration (i.e., conceptual fluency) will, in turn, increase attitude toward the eco-label logo. Formally:

H₇: Conceptual fluency explains the positive effect of green colour on attitude toward the eco-label.

We propose conceptual fluency as the mechanism explaining also the positive relationship between eco-label text amount and consumers' attitudes toward eco-label logos. In general, more descriptive logos need not have different design characteristics than less descriptive logos (i.e., additional space for inserting textual information), and the presence of text increases perceived trustworthy and credibility toward the logos (Alter & Oppenheimer, 2009; Reber & Unkelbach, 2010) and for that

reason they are easier to process because they are more conceptually fluent (Labroo et al., 2008; Lee & Labroo, 2004), as they are more likely to activate associations (i.e., concepts) related to the type of product a brand markets (Luffarelli et al., 2019). Similarly, the presence of words on eco-label design (i.e., sponsor organization, organization-website, sustainable words) is aimed at facilitating the elaboration of the eco-label meaning, consequently consumers will be more likely to understand the meaning of eco-labels containing a high (vs. low) quantity of text. Since conceptual fluency is improved by semantic predictability (Whittlesea, 1993; Labroo et al., 2008; Lee & Labroo, 2004) we can expect that the more textual information in a logo eco-label, the easier the processing of eco-label meaning will be, with a consequent increase in consumers' attitude toward the eco-label logo. Formally:

***H₈:** Conceptual fluency explains the positive effect of text amount on attitude toward the eco-label.*

We tested our hypotheses in three studies (see figure 1).

FIGURE I HERE

3.MATERIALS & METHODS¹

3.1 Pre-Test: Measuring Design Elements of Eco-Labels

We first conducted a pre-test study to measure visual and conceptual complexity of selected eco-labels, following the same procedures of Miceli et al. (2014), then we conducted Study 1.

We used the fifteen eco-label logos that were selected by Donato and Adıgüzel (2022) because of their popularity in the Italian market. In particular the labels were selected on the basis of the

¹ All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The identity of respondents was completely anonymous. Informed consensus was obtained from all individual participants included in the study.

observation of the labelled products available on the website of five Italian retailers (two general supermarkets, two discounts and one specialty store focused on organic products). The selected eco-labels cover social, environmental and economic sustainability goals, in particular, four eco-labels certify the sustainable management of resources and production processes (i.e., FSC, PEFC, Rainforest Alliance and EMAS); seven eco-labels certify organic production (i.e., EU eco-label, ICEA, SOIL, ICEA, USDA, AB, RSPO), two eco-labels certify fair trade (i.e., Fairtrade, WFTO), and two eco-labels certify sustainable marine management (i.e., MSC, ASC). The selected labels were saved as a JPEG file (bitmaps of 250×250 pixels) after some adjustments in paint program to put them in the same size (see Appendix A). Visual and conceptual complexity scores were collected from different samples for preventing common method bias (Podsakoff et al., 2003).

Regarding visual complexity measure we adopted a procedure similar to Miceli et al., (2014), asking three academics and one expert in graphical design (3 males, 1 female, $M_{age} = 43.25$, $SD = 8.88$) to assess visual complexity of each eco-label independently on a seven-point rating scale, higher values indicating higher visual complexity. We provided each judge with the visual complexity definition (i.e., the variety of visual elements featured by a logo). Reliability between experts was good ($\alpha = 0.83$), indicating agreement between them.

Since conceptual complexity refers to the ability of a logo to evoke multiple meanings but not a consensually held one (Perussia, 1988), twenty-two undergraduate students (11 females, $M_{age} = 22$ years, $SD = 1.56$) listed up to ten meanings they associate with the proposed 15 eco-labels (without text, see Appendix B) randomly shown. Then we computed an entropy score where highest values indicate high conceptual complexity (Ellis et al., 1974; Henderson & Cote, 1998), using the following formula¹:

$$entropy = - \sum p_i \ln(p_i)$$

where p_i represents the probability distribution of the word which is associated with the eco-label and i is the index of number of words associated.

Conceptual and visual complexity measures of selected eco-labels were reported in Table 1. The averages of individual ratings were similarly used in research on logo's design and response (e.g., Henderson & Cote, 1998).

Text amount was measured as the number of words contained on each eco-label and higher values indicate more information. For identifying the green colour presence in each eco-label, we used an online computer algorithm based on clustering RGB colour channel² for identifying the colour percentages in eco-labels and the values and listed in Table 1. The online algorithm calculates the predominant colors as they are the most pervasive in a JPEG/JPG photo. We used the "Extract Average Colors" option which combines similar tones together, then similarly to Dew et al., (2021) we computed the average value of the tones and presented the most popular average tones in terms of percentage. Then green, blue, black, and white colour dummies were created based on the most predominant colour percentage³.

TABLE 1 ABOUT HERE

3.2 STUDY 1

3.2.1 Sample

The objective of Study 1 was to understand the effects of design elements, namely visual and conceptual complexity, dummies indicating predominant colour on the eco-label logo, and text amount, on attitude toward the eco-label.

Data were collected with an online survey from 985 Italian adults recruited through an online platform (i.e., Winnerland.com) on exchange of a remuneration bonus. We chose to administer the study through this platform to have an easy access to a more representative sample of adult Italian

² <https://onlinejpgtools.com/find-dominant-jpg-colors>

³ For instance, percentages of green tones present on logo (such as forest green, yellow green, light sea green...) were summed up to obtain green percentage on the logo. If the green percentage on the logo was higher than other colours' percentages for the same logo, it was coded as 1 for the predominant green dummy variable.

consumers generally responsible for their shopping behaviour for which eco-labels design could affect their buying behaviour. After the elimination of incomplete answers, the study sample consists of 760 subjects (61% female; $M_{\text{age}} = 40.23$, $SD_{\text{age}} = 16.87$).

3.2.2 Study 1 Methodology

Each eco-label picture was in original colour and the same size. The order of eco-labels was randomized to prevent any order effect. Participants were firstly exposed to an eco-label and reported whether they recognized the eco-label logo (1) or not (0). Then we measured consumers' attitude toward eco-label on a seven-point Likert scale (Lin & Chang, 2021). Since environmental concern is related to pro-environmental behaviours, we included it as a control variable and measured with the three-items seven-point Likert scale proposed by Luchs and Mooradian (2012; $\alpha = .86$, $M = 6.07$, $SD = 1.03$).

We considered attitude toward the eco-label logo as the dependent variable, whereas pre-test measures of visual and conceptual complexity, text amount, predominant colour dummies⁴ as independent, and eco-label recognition, environmental concern, age and gender as control variables. Predominant colour dummies of green, blue and black were compared against white which was the most popular option for background among 15 eco-labels. We ran multilevel ordered logistic model with STATA 14 for attitude toward eco-label logo. Multilevel regression models were used because each subject assessed 15 eco-label logos and attitude toward eco-label was measured with an ordinal scale. We used standardized scores of the variables to facilitate interpretation of the magnitude of the effects.

3.3 STUDY 2

3.3.1 Sample

The objective of study 2 is twofold: first, test visual complexity, conceptual complexity, and green colour effects without text, and second verify the underlying mechanism explaining the relationship

⁴ We run the analyses also considering colour percentages on the eco-label logos, and the conclusions did not change.

between visual format (i.e., visual, conceptual complexity and predominant colour dummies) and attitude toward the eco-label considering a non-Italian sample. We administered our study to 151 US subjects recruited through Amazon's M-Turk platform (48% female; $M_{age} = 39.89$, $SD_{age} = 12.69$). M-Turk platform allowed us to select a convenience non-Italian sample of adult consumers and therefore to extend the generalizability of the proposed results.

Differently from previous study, we decided to present the same fifteen eco-labels of Study 1 but without any text to reduce the effects of past exposure and to prevent confounding of verbal processing (Miceli et al., 2014, see Appendix B).

3.3.2 Study 2 Methodology

For each of the 15 eco-label logos, participants first saw the eco-label logo and then they rated their perceived familiarity with a single item scale (Bickart & Ruth, 2012; 1 = not familiar at all, 7 = very familiar, $M = 2.26$, $SD = 1.84$). Then, they indicated their attitude toward the target eco-label logo with a seven-point scale (Miceli et al., 2014, 1 = do not like at all, 7 = like a lot), and answered to a set of fluency measures. Perceptual fluency was measured through two seven-point rating items (Labroo et al., 2008; 1 = not at all, 7 = a lot, $\alpha = 0.91$). Conceptual fluency was also measured through two items seven-point scale developed by Miceli et al. (2014) ($\alpha = 0.96$). After label assessments, demographic information (age and gender) was collected. Each label was shown in a randomized order to prevent any order effect.

Pre-test measures of visual and conceptual complexity, and predominant colour dummies were used as independent variables. Attitude toward eco-label logo was the dependent variable, perceptual and conceptual fluency were the mediators. Remaining control variables were familiarity, age and gender (1: females, 0: males). We conducted a multilevel regression model for fluency scores and multilevel ordered regression model for attitude toward eco-label logo with STATA 14. Since fluency scores are continuous and each participant assessed fifteen eco-labels, multilevel linear regression model was used. The mediating effect test has been conducted in three steps (Baron & Kenny, 1986).

3.4 STUDY 3

3.4.1 Sample

The objective of Study 3 is to examine whether processing fluency dimensions can also explain the relationship between text amount in eco-label and eco-label attitudes (H_8).

In this case we considered again the same fifteen eco-labels of previous studies including their text (i.e., same as Study 1). In doing that we selected as a convenience sample of 219 students at a large Italian University that participated in exchange of course credit (66% female; $M_{\text{age}} = 22.15$, $SD_{\text{age}} = 1.03$). We chose to administer the study to Italian students firstly because we wanted to demonstrate the mediation role of conceptual fluency between (Italian) logo text amount and consumers' attitude, and secondly because we wanted to generalize our results also to young consumers.

3.4.2 Study 3 Methodology

Each subject assessed the same fifteen eco-labels used in study 1 in a randomized order to prevent any order effect. Familiarity, processing fluency dimensions, attitude toward the eco-label were measured as in study 2. Text amount was measured as the number of words as in Study 1.

Predominant colour dummies, text amount, visual and conceptual complexity measures of eco-labels from the pre-test study were used as independent variables. Attitude toward the eco-label was the dependent variable, perceptual and conceptual fluency were the mediators. Control variables were perceived familiarity of eco-label, environmental concern (Haws et al., 2014; $\alpha = 0.88$, $M = 4.79$, $SD = 1.07$), general use of eco-label ("*I check eco-label logos on a product package when I shop*", $M = 3.80$, $SD = 1.54$), age and gender (1: females, 0: males or I prefer not to say). We conducted a series of multilevel regression models with STATA 14.

4.RESULTS

4.1 Study 1 Results .

Descriptive statistics for eco-label attitude and recognition were presented in Table 2 and results were shown in Table 3. Model 1 indicated the effects of visual and conceptual complexity, text amount, predominant colour dummies and control variables on eco-label logo. Model 2 and Model 3 included the interaction effects of text amount and green colour for visual and conceptual complexity, respectively.

TABLE 2-3 ABOUT HERE

While visual complexity had a positive effect on eco-label attitude ($b = 0.36, p < 0.001$), the effect of conceptual complexity was significant and negative ($b = -0.14, p < 0.001$). When text amount increased ($b = 0.23, p < 0.001$), eco-label attitude increased. Eco-label attitude was higher for green ($b = 0.43, p < 0.001$), blue ($b = 0.48, p < 0.001$), and black ($b = 0.42, p < 0.001$) compared to white as a predominant colour. Recognized eco-labels presented a higher attitude than non-recognized eco-labels ($b = 1.53, p < 0.001$). When environmental concern ($b = 0.74, p < 0.001$) and age of consumer increased ($b = 0.45, p < 0.001$), eco-label attitude increased. There was no significant difference in eco-label attitude between males and females. The interaction models (Model 2 and 3) indicated that the negative effect of conceptual complexity on eco-label logo on consumers' attitude decreased when predominant colour on logo is green and there is more text on the logo. The positive effect of visual complexity on attitude toward eco-labels decreased when there is more text on the logo; however, the positive effect of visual complexity on attitude toward eco-labels increased when predominant colour on eco-label logo is green.

Thus, consistent with H_1 and H_2 , visual complexity positively affects attitude toward the eco-label, whereas conceptual complexity negatively affects it. Moreover, consistent with H_3 and H_4 , the eco-labels that present predominantly green and more text are those with higher consumers' attitudes.

4.2 Study 2 Results

The descriptive statistics for attitude toward eco-label and familiarity were shown in Table 2.

Familiarity ($M = 2.26$, $SD = 1.84$) of eco-labels was very low, in the range of 1.86-2.87 out of 7, however we still included it as a covariate.

Given our hypotheses that effects on attitude toward eco-label would be mediated by perceptual and conceptual fluency, we first discussed results regarding dependent variable model, then mediator variables models, and dependent variable model with mediators. All model results were presented in Table 4.

Attitude toward the eco-label. First, we examined the effect of all the independent variables on attitude toward the eco-label logo without mediators (Model 0). Visual complexity had a positive effect on attitude toward the eco-label logo ($b = 0.61$, $p < 0.001$), confirming H_1 again. The effect of conceptual complexity was opposite: When conceptual complexity increased, attitude toward the eco-label logo decreased ($b = -0.31$, $p < 0.001$), thus confirming H_2 . Additionally, compared to eco-label logos with predominant white colour, green and black ones had higher attitude ($b_{green} = 0.36$, $p < 0.001$; $b_{black} = 1.41$, $p < 0.001$, $b_{blue} = 0.04$, $p = 0.79$), confirming H_3 . Familiarity had a positive effect on attitude toward eco-label logo ($b = 0.70$, $p < 0.001$).

Perceptual Fluency. Perceptual fluency was regressed on independent and control variables (Model 1a). Visual complexity had a significant positive effect on perceptual fluency ($b = 0.28$, $p < 0.001$) whereas the impact of conceptual complexity was significant negative ($b = -0.13$, $p < 0.001$). When predominant colour on eco-label logo is green or black, perceptual fluency was higher compared to white ones ($b_{green} = 0.10$, $p < .05$; $b_{black} = 0.61$, $p < 0.001$), but there was no difference in attitudes toward eco-label presenting blue and white predominant colours ($b_{blue} = 0.04$, $p = 0.54$). Perceptual fluency significantly increased with age ($b = 0.13$, $p < 0.01$) and familiarity ($b = 0.25$, $p < 0.001$), but did not differ with gender ($b = -0.13$, $p = 0.13$).

Conceptual Fluency. In Model 1b, conceptual fluency was regressed on independent and control variables. While conceptual complexity had a significant negative effect on conceptual fluency ($b = -0.16$, $p < 0.001$), the effect of visual complexity was significantly positive ($b = 0.11$, $p < 0.001$).

Eco-label logos with green and black predominant colour had a higher conceptual fluency compared to the ones with white one ($b_{green} = 0.07, p < 0.05$; $b_{black} = 0.36, p < 0.001$); however, there was no difference observed in conceptual fluency for eco-label logos with predominantly blue colour ($b_{blue} = 0.06, p = 0.33$). Conceptual fluency increased with familiarity ($b = 0.34, p < 0.001$), but not with age ($b = -0.04, p = 0.39$) and gender ($b = -0.13, p = 0.20$).

Mediation Model. Both perceptual and conceptual fluency had positive effects on attitude toward eco-label logo in Model 2; however, the effect was larger for perceptual fluency ($b = 2.90, p < 0.001$) compared to conceptual one ($b = 0.64, p < 0.001$). When two mediators were added to the dependent variable model (Model 3), the effect of conceptual complexity was not significant anymore ($b = -0.08, p = 0.17$), indicating the mediating effect of conceptual fluency between conceptual complexity and attitude toward the eco-label logo. The effect of visual complexity was smaller compared to the dependent variable model without mediators (Model 0) ($b = 0.15, p < 0.01$), indicating the mediating effect of perceptual fluency between visual complexity and attitude toward the eco-label logo. Conceptual fluency also partially mediated the relationship between predominant green colour dummy and attitude toward the eco-label logo ($b_{green} = 0.30, p < 0.001$). Among covariates, only familiarity had a significant positive effect on eco-label attitude ($b = 0.17, p < 0.01$). Thus, H₅, H₆ and H₇ were confirmed.

TABLE 4 ABOUT HERE

4.3 Study 3 Results

Descriptive statistics of eco-label attitude, and familiarity were shown in Table 2. Eco-label with the highest positive attitude one was WFTO ($M = 4.68, SD = 1.52$) and with the lowest one was JAS ($M = 2.30, SD = 1.32$). As in Study 1 the three eco-label logos with the highest familiarity were FSC ($M = 4.32, SD = 2.17$), WFTO ($M = 3.50, SD = 2.00$), and organic EU ($M = 3.47, SD = 2.27$), and with the lowest ones were JAS ($M = 1.32, SD = 0.80$), USDA ($M = 1.42, SD = 0.89$), and SOIL ($M = 1.56, SD = 1.08$). All models of mediating effect tests were presented in Table 5. We discuss first

the dependent variable model, then mediator variable models, and the dependent variable model with mediators.

(INSERT TABLE 5 HERE)

Attitude toward the eco-label. The regression of attitude toward the eco-label on all independent and the two control variables without mediators (Model 0) indicated that compared to eco-labels with predominantly white, predominantly green and black eco-label logos presented a higher consumer's attitude ($b_{green} = 0.47, p < 0.001$; $b_{black} = 0.59, p < 0.001$; $b_{blue} = -0.02, p = 0.89$), confirming H₃. Besides, text amount had a positive effect on attitude toward the eco-label ($b = 0.16, p < 0.001$), confirming H₄. Moreover, visual complexity had a positive effect on attitude toward the eco-label ($b = 0.52, p < 0.001$), confirming H₁ again. As in H₂, the effect of conceptual complexity was opposite: It has a negative effect on attitude toward the eco-label, but it was not significant ($b = -0.01, p = 0.79$). Familiarity ($b = 0.95, p < 0.001$) and environmental concern ($b = 0.21, p < 0.01$) had a positive effect on attitude toward the eco-label.

Perceptual Fluency. In Model 1a, visual complexity ($b = 0.28, p < 0.001$) and text amount ($b = 0.09, p < 0.001$) had a positive effect on perceptual fluency; however conceptual complexity did not influence significantly perceptual fluency ($b = -0.01, p = 0.71$). While eco-labels with predominantly green ($b = 0.17, p < 0.001$) and black ($b = 0.24, p < 0.001$) had a significantly higher perceptual fluency compared to white ones, predominantly blue logos ($b = -0.05, p = 0.36$) did not present a significant difference in terms of perceptual fluency compared to white ones. When familiarity ($b = 0.36, p < 0.001$) and environmental concern ($b = 0.10, p < 0.01$) increased, perceptual fluency increased.

Conceptual Fluency. In model 1b, text amount had a positive effect on conceptual fluency ($b = 0.35, p < 0.001$). Eco-labels with predominantly green and blue had higher conceptual fluency than the one with white ones ($b_{green} = 0.38, p < .001$; $b_{blue} = 0.77, p < 0.001$). Additionally, conceptual fluency was lower for predominant black eco-labels compared to white ones ($b_{black} = -0.13, p <$

0.05). Visual ($b = 0.11, p < 0.001$) and conceptual complexity ($b = 0.10, p < 0.001$) had a positive effect of conceptual fluency. Familiarity ($b = 0.18, p < 0.001$) and environmental concern ($b = 0.07, p < 0.05$) had a positive effect on conceptual fluency.

Mediation Model. Attitude toward eco-label was regressed on two mediators, six independent and two control variables first separately (Model 2a, 2b) and then jointly (Model 3); however only Model 3 findings were discussed. Both perceptual ($b = 2.92, p < 0.001$) and conceptual ($b = 0.36, p < 0.001$) fluency positively affected eco-label attitude. The effect of visual complexity on eco-label attitude was positive but not significant ($b = 0.06, p = 0.21$), confirming H₅. The effect of conceptual complexity on eco-label attitude was not significant anymore ($b = -0.03, p = 0.49$), confirming H₆. The effects of text amount ($b = -0.09, p < 0.05$) and predominant green colour dummy ($b = 0.19, p < 0.05$) were significant, but the values were much smaller than Model 0, confirming H₈ and H₇. Only familiarity had a positive effect on label attitude among covariates ($b = 0.43, p < 0.001$).

5. DISCUSSION AND CONCLUSION

As a green marketing communication tool, eco-labels have the goal to signal products' environmental and ethical claims to socially responsible consumers and indicate producers' responsible behaviour and increase product and company attitudes even for not so environmentally concerned consumers. To yield all these benefits, eco-labels need to capture consumers' attention in likable ways similar to brand logos and advertising and they should be easily interpreted. So, understanding the effectiveness of design factors of eco-labels is as important as other marketing communication tools. Extending Donato and Adıgüzel (2022)'s findings on the role of visual complexity on eco-labels evaluations and Miceli et al. (2014)'s findings on the role of fluency for brand logos to the domain of eco-label logo design, this study investigated two new design elements, namely predominant colour dummies and text amount next to visual and conceptual complexity and focused on conceptual fluency.

This research makes an original contribution to eco-labelling, green marketing communication and logo design literature with three studies. First, using brand logo design literature, it provides information on the impacts of visual and conceptual complexity, green colour dominance and text amount on likeability and more in general consumers' attitude. Besides, it examines the moderating role of text amount and green colour dominance. Second, as a visual stimulus, the design elements of eco-label logo might drive consumer reactions and can be explained by perceptual and conceptual fluency. Therefore, we examined the mediating roles of conceptual fluency for text amount and green colour dominance.

Findings of Study 1 indicated that high visual and low conceptual complexity helped to increase attitude toward eco-labels, in line with brand logo literature (Henderson & Cote, 1998; Henderson et al., 2003; van der Lans et al., 2009; Miceli et al., 2014). The study also indicated that eco-labels with high text amount were more liked, this result might be caused by the presence of more information given on the labels. For instance, Atkinson and Rosenthal (2014) also proved that specific arguments on eco-labels compared to general arguments (i.e., a simple green graphic with two arrows and leaves, without any text) yielded more positive attitudes toward label, and higher label trust. In terms of attitude toward eco-label, eco-labels had the highest consumers' attitudes when the dominant colour is green or blue. This finding is in line with previous literature, in fact green logos have been shown to create ethical and eco-friendliness perceptions (Lim et al., 2020; Sundar & Kellaris 2017); moreover, Seo and Scammon (2017) indicated that combinations of green colour on product packages enhanced the fluency of a message and increase consumers' green decisions. Sundar and Kellaris (2015) illustrated that green and blue product packages brought equal amount of environmental evaluations because they share the same meaning of eco-friendliness. Interaction effects proved that attitude toward eco-label logos increased for visually and conceptually complex eco-label logos when text amount increased and dominantly green colour on logo was used. Thus, there was not anymore negative effect of conceptual complexity on attitude toward eco-label logos when there was sufficient informative text and green colour used.

Study 2 indicated that the effect of eco-labels complexity on consumers' attitude can be explained by perceptual and conceptual fluency (Miceli et al., 2014). Both conceptual and perceptual fluency mediated the relationship between predominant green colour dummy and eco-label attitude. Seo and Scammon (2017) claimed the relationship between colour and conceptual fluency the first time, however, Reber and Schwarz (1999) stated that colour can also influence perceptual fluency. Accordingly, our study indicates that green colour increases both perceptual and conceptual fluency, and in turn also eco-label attitude.

According to Study 3 findings, text amount on eco-labels and prominent green colour on logo increased eco-label attitudes due to increased conceptual fluency. Visual complexity also increased eco-label attitudes due to increased perceptual fluency. In case of presence of text and colour, conceptual complexity influenced positively conceptual fluency and consequently eco-label attitudes. When both text and colour cues were present, conceptually complex eco-labels still generated high conceptual fluency (i.e., understandability). Conceptual fluency increased with text amount (i.e., more informative) in the eco-label logo. However, when there was no text, conceptually complex eco-labels had low conceptual fluency in study 2. This result confirms the useful role of text amount in eco-label logos to increase processing fluency. Indeed, Luffarelli et al., (2019) indicated that more (vs. less) descriptive logos were easier to process and therefore they were assessed better by consumers.

Overall, FSC and JAS were the most and the least recognized eco-labels, respectively in study 1. JAS was the least familiar eco-label in study 2 and 3, WFTO and FSC were the most familiar eco-labels, respectively in study 2 and 3. Attitude toward eco-label was high for environmental concerned (study 1,3) and old consumers (study 1); moreover, it was high when consumers recognized the eco-label (study1) or when they were familiar with it (study 2,3).

5.1 Theoretical Implications

Despite previous research have largely investigated the impact of logos on consumer behaviour (Henderson & Cote, 1998; Zaichkowsky, 2010; Miceli et al., 2014), little is known about the

impacts of eco-labels on consumer attitude toward eco-labels. This is because much of the research on eco-labelling has focused on either their trust and credibility or third-party independent seals, and certification labels (Thøgersen, 2000; Teisl et al., 2008; Atkinson & Rosenthal, 2014), comparisons of eco-labels to other types of signalling cues such as sustainability tags, nutrition or origin labels (Sirieix, et al., 2013; Dekhili & Achabou, 2014; Sigurdsson et al., 2022), sales outcomes deriving from eco-labels (Teisl et al., 2002) and consumer-specific factors affecting eco-label use in decision making, as the level of environmental concern, consumers' belief in responsible purchase behaviour, and consumers' environmental orientation (Thøgersen, 2000; Bickart & Ruth, 2012; Gaspar Ferreira & Fernandes, 2022). To our knowledge, our study is the first systematic attempt aimed at exploring the effect of eco-label design elements on the attitude toward the eco-label.

Prior research has often examined the influence of visual complexity on consumers' evaluations of stimuli independently from other design elements (Henderson & Cote, 1998; Orth & Malkewitz, 2008; Van der Lans et al., 2009), namely text, colour and conceptual complexity. By examining these jointly, we delineate conditions under which both visual and conceptual complexity influences eco-label evaluations. Moreover, contrary to previous studies that analysed different dimensions of complexity only (Pieters et al., 2010; Miceli et al., 2014; Donato & Adıgüzel, 2022), we additionally investigated the benefits of text amount and predominant colour on logo for eco-labels. Extending Donato and Adıgüzel (2022)' findings on the positive effect of visual complexity on labelled products evaluations through perceptual fluency, the present study illustrates the positive impact of other two design elements, namely green colour and text amount, on conceptual fluency. Only when the eco-label logo does not contain any text, the negative effect of conceptual complexity on conceptual fluency was supported, confirming Miceli et al., (2014)' findings. Moreover, this research extends also Miceli et al. 2014's findings on the impact of visual and conceptual complexity of black and white brand logos without text, on logo attitude through processing fluency to the domain of eco-label design. Firstly, our findings confirm the positive

effect of visual complexity on perceptual fluency, secondly, our results suggest that text amount increases attitude toward eco-labels through increased conceptual fluency. Predominant green colour on logos increases conceptual fluency and consequently attitude toward eco-labels.

5.2 Practical Implications

The implications of this research should interest to third-party label organizations, NGOs, public policy, companies and brand managers. To increase sustainable consumption in future, likability and understandability of eco-labels can be increased including descriptive text on eco-label logos and using predominantly green or blue colour. Accordingly, eco-labels should be sufficiently high in visual complexity to be visually interesting, but low in conceptual complexity to create the same sustainability associations for any consumers. A simple pre-test about whether or not a designed eco-label creates single versus multiple meanings is suggested. The predominant colour should be better green to increase perceptual and conceptual fluency and to signal effectively responsible products. We suggest using explanatory text such as sponsor name or words aimed at creating meanings associated to sustainability on the eco-label logos for increasing consumers' understanding and attitudes. For instance, EU organic eco-label should include text such as EU-bio or EU-eco to increase its effectiveness. When eco-labels do not include text (like a sponsor name or explanatory words), conceptually complex eco-labels are difficult to understand with consequent negative effect on consumers' attitude.

Retailers, producers, environmental NGO's and public policy makers should educate consumers about eco-labels to increase sustainable consumption. In our study, older (versus younger) consumers were more positive about eco-labels, as, the average of checking eco-label logos on product packages during shopping was low (i.e., 3.8 out of seven). Some additional advertising campaigns are required to increase familiarity and eco-label awareness among young consumers.

5.3 Limitations and Future Research

As with all research, this study is not without limitations. First, only a set of existing fifteen eco-labels were preferred to study instead of fictional eco-labels. While fictional eco-labels might

prevent any familiarity and multiple exposure effects, we believed that a naturalistic setting would allow us to give a good picture of current consumer evaluations toward eco-labels in the marketplace. However, further research can experimentally manipulate the studied graphical dimensions considering fictitious eco-labels and isolating cause-effect relationships, with the objective of replicate our results. Furthermore, despite the selected 15 eco-labels cover different types of sustainability, we acknowledge the presence of possible biases in our results as according to ecolabel index there are more than 450 eco-labels available on the market (<https://www.ecolabelindex.com/>). However, since our objective is to determine the impact of graphical elements such as visual and conceptual complexity, text amount and colour predominance on eco-labels attitude, we do believe that considering 15 eco-labels gave us a sufficient variance in terms of the possible combinations of such graphical elements, and that the found results can represent a valuable starting point for further research on the effect of visual design in the sustainability domain. Therefore, additional studies on understandability of a high number of existing eco-labels can further help to understand eco-labels effectiveness.

To increase sustainable consumption, finding an optimal eco-label design which can be noticeable and understandable globally, can help to reduce the huge number of eco-labels and might help to increase sustainable choices in future. Amazon's recent introduction of climate pledge friendly eco-label is just one of attempt as an umbrella eco-label covering various credible eco-labels. Besides, additional studies are required for testing if the found effects differ in case of multiple eco-labels exposure.

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ENDNOTES

¹ For example, if in response to an eco-label 50% of respondents indicated "green", 30% indicated "tree", and 20% indicated "love", the degree of entropy was equal to $- [.50 * (\ln (.50)) + .30 * (\ln (.30)) + .20 * (\ln (.20))] = 1.03$. This index can reach a maximum point equal to +3 if the 22 respondents report 22 different words for the eco-label ($-20 * .05 * (\ln (.05)) = -20 * (-. 15) = 3$), while it can reach a minimum of zero if the 22 respondents report the same word for the eco-label ($-20 * 1 * (\ln (1)) = 0$).

Figure 1. Conceptual Model

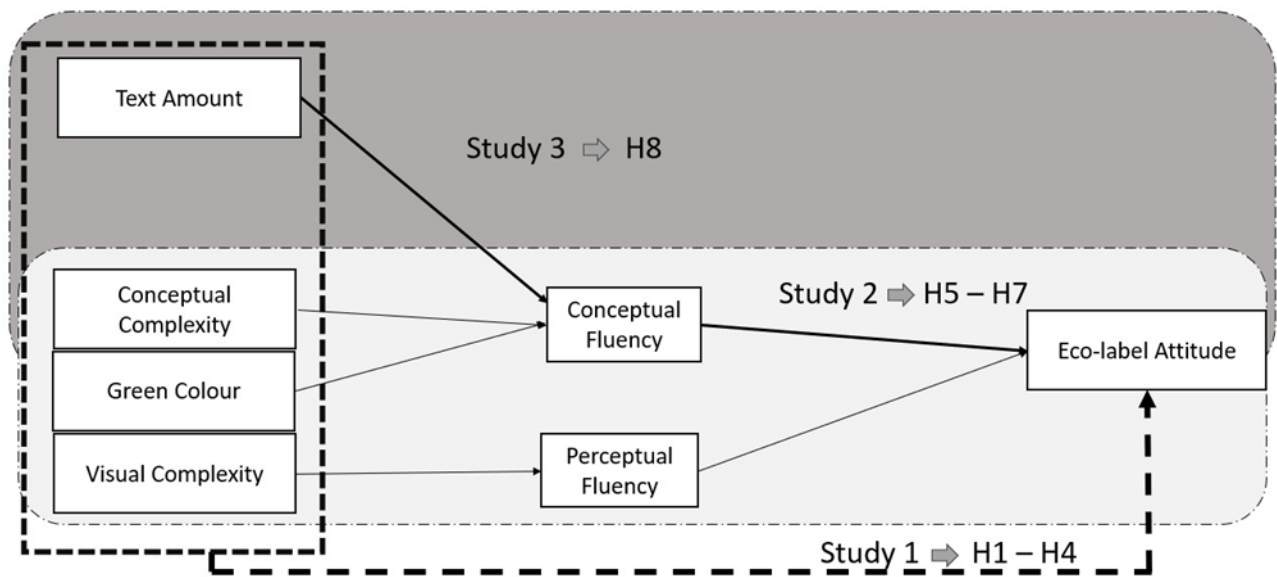


TABLE 1**Pre-test: Design elements' scores of eco-labels**

Eco-label	Visual complexity Mean	Conceptual complexity Mean	Text Amount	Predominant Colour	Colour % with text ^a	Colour % without text
Organic EU	3.50	1.6334	0	Green	Green:95.29 white:3.4	Green:95.29 white:3.4
ASC	3.50	1.6118	5	Blue	Green:71.67 White:28.33 Blue:0	Green:80.47 White:19.53 Blue:0
WFTO	5.25	2.6094	4	White	White:55.35 Blue:18.61 Green:10.84	White:66.10 Blue:17.36 Green:8.24
JAS	3.25	2.1271	1	White	White:62.84 Green:37.96	White:64.8 Green:35.2
SOIL	4.25	2.6610	3	White	White:89.44 Black:7.17	White:94.42 Black:5.58
MSC	3.50	1.6872	5	Blue	Blue: 75.85 White:22.15	Blue: 83.97 White:16.03
EMAS	4.25	2.1582	1	White	White: 67.66 Blue:22.36 Green: 6.46	White: 74.25 Blue:19.94 Green: 4.05
PEFC	3.50	1.0048	2	White	White: 70.35 Green: 24.7	White: 80.15 Green: 19.85
RAIN	5.00	2.0636	5	White	White: 52.16 Green: 29.54	White: 50.3 Green: 36.08
USDA	2.00	1.5237	2	White	White: 65.32 Green:15.74	White: 57.38 Green:24.77
FAIR TRADE	3.50	2.4314	2	Black	Black: 65.3 Blue:20.32 Green: 7.83 White:1.96	Black: 70.6 Blue:16.67 Green: 7.79 White:0
AB	3.00	1.7342	3	Green	Green: 62.8 White:37.2	Green: 37.52 White:58.64
RSPO	3.25	2.1827	7	White	White: 63.74 Green:31.08	White: 65.27 Green:30.2
FSC	2.50	1.6426	10	Green	Green: 66.66 White:29.15	Green: 68.63 White:30.39
ICEA	4.25	2.3402	5	White	White:66.34 Green:33.66	White:81.44 Green:18.56

^a.<https://onlinejpgtools.com/find-dominant-jpg-colors>

TABLE 2**Studies' descriptives**

Eco-label	Study 1 Recog- nition Yes%	Study 1 Eco-label Attitude Mean (SD)	Study 2 Eco-label Familiarity Mean (SD)	Study 2 Eco-label Attitude Mean (SD)	Study 3 Eco-label Familiarity Mean (SD)	Study 3 Eco-label Attitude Mean (SD)
Organic EU	44.7	4.62(1.59)	2.11 (1.78)	4.34 (1.59)	3.47(2.27)	4.12(1.67)
ICEA	18.8	4.52(1.54)	2.18 (1.76)	3.81 (1.58)	2.27(1.64)	4.12(1.45)
FSC	58.4	4.73(1.51)	2.21 (1.83)	3.46 (1.76)	4.32(2.17)	4.05(1.46)
RSPO	11.4	4.52(1.50)	2.03 (1.74)	3.74 (1.56)	1.86(1.43)	3.16(1.68)
AB	32.6	4.78(1.49)	2.23 (1.86)	4.19 (1.58)	2.53(1.81)	4.24(1.42)
Fair Trade	27.1	4.40(1.57)	2.40 (1.94)	4.58 (1.60)	2.53(2.00)	3.79(1.63)
USDA	7.2	3.76(1.60)	2.57 (1.95)	3.38 (1.69)	1.42(0.89)	2.68(1.37)
RAIN	23.2	4.71(1.54)	2.57 (1.98)	4.83 (1.56)	2.34(1.81)	4.63(1.55)
PEFC	19.2	4.38(1.53)	2.17 (1.88)	4.03 (1.70)	1.89(1.37)	3.03(1.40)
EMAS	8	3.95(1.61)	2.10 (1.77)	4.08 (1.71)	2.07(1.56)	2.79(1.44)
MSC	42.9	4.80(1.56)	2.19 (1.79)	3.93 (1.64)	3.20(2.08)	3.74(1.58)
SOIL	5.7	4.04(1.57)	2.08 (1.71)	3.36 (1.76)	1.56(1.08)	3.42(1.55)
JAS	3.7	3.78(1.61)	2.03 (1.74)	3.40 (1.72)	1.32(0.80)	2.30(1.32)
WFTO	27.6	4.68(1.53)	2.87 (1.99)	4.64 (1.49)	3.50(2.00)	4.68(1.52)
ASC	23.2	4.50(1.55)	2.10 (1.75)	3.91 (1.54)	2.33(1.64)	3.16(1.52)

TABLE 3**Results of multilevel regression models for study 1 (standardized coefficients)**

Study 1			
	Model 1	Model 2	Model 3
	Attitude eco-label Main effects	Attitude eco-label Interaction effects	Attitude eco-label Interaction effects
Visual complexity	.36***	.35***	.32***
Conceptual complexity	-.14***	-.13***	-.02
Text Amount	.23***	.33**	.36***
Predominant Colour: Green	.43***	.46***	2.48***
Predominant Colour: Blue	.48***	.48***	.71***
Predominant Colour: Black	.42***	.46***	.74***
Eco-label recognition	1.53***	1.56***	1.54***
Visual complexity×Text		.23***	
Visual complexity×Green		-.25*	
Concep. complexity×Text			.38***
Concep. complexity×Green			2.65***
Environmental concern	.74***	.74***	.75***
Age	.45***	.46***	.46***
Female (1)	.03	.03	.04
Wald	1691.34	1716.58	1888.94

Notes. * $p < .05$ ** $p < .01$ *** $p < .001$

TABLE 4

Study 2: Mediating effect tests (Standardized regression coefficients)

	Dependent variable model	Mediator variable models		Dependent variable model with mediators			
	Attitude ecolabel Model 0	Perceptual Fluency Model 1a	Conceptual Fluency Model 1b	Attitude ecolabel Model2	Attitude ecolabel Model3	Attitude ecolabel Model3a	Attitude ecolabel Model3b
Visual Complexity	.61***	.28***	.11***		.15**	.19**	.37***
Conceptual complexity	-.31***	-.13***	-.16***		-.08	-.14*	-.10
Predominant Colour:Green	.36***	.10*	.07*		.30**	.40***	.31**
Predominant Colour:Blue	.04	.04	.06		-.04	.03	-.01
Predominant Colour:Black	1.41***	.61***	.36***		.42*	.47**	1.06***
Age	.21	.13**	-.04	-.02	-.02	-.08	.30**
Female (1)	-.32	-.13	-.13	-.04	-.04	-.08	-.14
Perceptual Fluency				2.90***	2.88***	3.1***	
Conceptual Fluency				.64***	.63***		1.83***
Familiarity	.71***	.25***	.34***	.16*	.17**	.34***	.19**
Cons		-.01	.01				
Wald chi2(4)	299.29	339.81	419.17	1501.03	1508.83	1506.75	870.33

Notes. * $p < .05$ ** $p < .01$ *** $p < .001$

TABLE 5

Study 3: Mediating effect tests

	Dependent variable model	Mediator Variable model	Mediator Variable model	Dependent variable model with only mediators Mod. 2	Dependent variable model with mediator1 Model 3a	Dependent variable model with mediator2 Model 3b	Dependent variable model with mediators Model 3
	Model 0	Model 1a	Model 1b	Attitude eco- label	Attitude eco- label	Attitude eco- label	Attitude eco- label
Visual Complexity	.52***	.28***	.11***		.06	.46***	.06
Conceptual complexity	-.01	-.01	.10***		.00	-.11*	-.03
Text amount	.16***	.09***	.35***		.02	-.14***	-.09*
Predominant Colour:Green	.47***	.17***	.38***		.30***	.18*	.19*
Predominant Colour:Blue	-.02	-.05	.77***		.15	-.75***	-.15
Predominant Colour:Black	.59***	.24***	-.13*		.23	.77***	.31*
Familiarity	.95***	.36***	.18***	.43***	.43***	.84***	.43***
Env. Conc.	.21**	.10**	.07*	.04	.05	0.16*	.04
Use	-.06	-.01	.00	-.08	-.07	-.06	-.08
Age	-.07	-.01	.02	-.08	-.07	-.10	-.08
Female (1)	-.13	-.11	-.01	.13	.14	-.12	.13
Perceptual Fluency				2.95***	3.03***		2.92***
Conceptual Fluency				.31***		.95***	.36***
Cons		.02	-.14***				
Wald chi2(4)	909.62	1126.02	1566.21	2402.21	2400.31	1296.21	2405.58

Notes. Significance level: **0.01 * 0.05 *** 0.001 Env. Conc.: Environmental concern

Web Appendix A
Eco-labels with text

			
		 Il marchio della gestione forestale responsabile.	
 RSPO-1106097			
			

Web Appendix B
Eco-labels without text