



## Review article

# Consumers' categorization of eco-friendly consumer goods: An integrative review and research agenda

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## ABSTRACT

Understanding how consumers categorize a consumer good as eco-friendly is key to facilitating consumers' purchasing of products with lower environmental footprints. Scholarship has increasingly addressed this question. However, most research has examined a single cue that prevents the building of a holistic explanation. An integrative review of studies may provide not only a synthesis of the state of the art but also an overarching integrative theoretical framework that explains what cues consumers use to categorize products as green and the mechanisms guiding the interpretation of these cues. This review of 29 studies examining consumers' assessment of eco-friendliness in consumer goods unearths five cues used as surrogate indicators of eco-friendliness. Nevertheless, these cues are not entirely related to the actual environmental footprint of a product based on the life cycle assessment. Drawing from schema categorization theory, an integrative theoretical framework is presented whereby categorization processes are said to be guided by consumers' lay theories. A research agenda is outlined to stimulate new lines of inquiry around lay theories and product attributes.

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## 1. Introduction

Most of the work on sustainable consumption has explored antecedents of consumer preferences for green products (Costa et al., 2021; ElHaffar et al., 2020; Joshi and Rahman, 2015). This scholarship assumes that consumers can confidently discriminate between more and less environmentally friendly products. However, this assumption does not seem to hold. Other research shows that although consumers understand what sustainability entails and what type of corporate practices are necessary to improve green performance (Hanss and Böhm, 2012), when they encounter a consumer product, consumers are limited in their ability to assess its environmental footprint (e.g., Steenis et al., 2017), especially when the whole production cycle is considered (Heijungs et al., 2010). Thus, it is necessary to understand how consumers categorize products as more or less eco-friendly before understanding what drives their preferences towards these products.

Past work has shown that indexical cues guide consumers' categorization of products as eco-friendly (Rajagopal and Burnkrant, 2009; Schleenbecker and Hamm, 2013; Thøgersen, 2011). These claims can comprise, for instance, third-party certifications such as USDA Organic, sustainable claims about the absence of undesirable traits (e.g., paraben-free), or claims about positive characteristics (e.g., animal cruelty-free). However, most products do not have a sustainable claim; for example, in the US in 2018, only 16.6 % of consumer goods had a sustainability-related claim on packaging (Whelan and Kronthal-Sacco, 2019).

In the absence of these indexical cues, consistent with cue utilization theory (Richardson et al., 1994), consumers will interpret iconic cues—such as packaging material or brand name—as surrogate sustainability indicators (Steenis et al., 2017). Iconic cues are attributes that suggest a superior fit with expectations but lack an externally verifiable reference point (Mick, 1986). Thus, by using iconic cues, consumers may inaccurately assess the eco-friendliness of consumer products (Lazzarini et al., 2017).

Understanding which cues consumers attend to and how these cues are interpreted is fundamental to depict the schema of the environmentally friendly consumer product consumers hold. Inaccurate categorization may lead to suboptimal choices and unsatisfactory decisions if consumers purchase products perceived as greener when they are not (Pickett-Baker and Ozaki, 2008). Past studies have made some inroads into this issue. However, an integrated perspective is missing that explains which cues consumers use to assess the greenness of products, how they interpret these cues, and why they make such interpretations. An integrative review (Snyder, 2019; Torraco, 2005) of 26 journal articles (29 studies) was carried out to address this gap. Integrative reviews are more appropriate when the study aims to synthesize, critique, and offer a revised perspective (Bangsa and Schlegelmilch, 2020; ElHaffar et al., 2020). These are precisely the objectives of this review: to provide a synthesis of past studies, to critically examine the methods and theories used, and to provide an integrative theoretical framework that can guide further research.

The contribution of this paper is threefold. First, by taking stock of scattered literature, it synthesizes five iconic attributes used as cues of eco-friendliness by consumers: color, imagery, packaging materials, origin, and brand characteristics. The delineation of the so-perceived green consumer product will be helpful for new researchers and practitioners. Second, it critically assesses the state of the art to identify the issues and topics that are less or poorly understood. Our understanding of why consumers pay attention to these cues is limited due to the restricted available evidence and the marginal theoretical development in existing scholarship. To illustrate, only half of the studies build on theory. Although some authors (Steenis et al., 2017; Pancer et al., 2017; Wood et al., 2018) tentatively proposed mechanisms that could explain why consumers use these cues to categorize products as green, there is no overarching framework that can explain the process followed by consumers to categorize products as more or less green. Specifically,

although these authors suggested that lay theories or intuitive beliefs may be involved in this process, they did not articulate how these beliefs may modulate the consumers' categorization process. To bridge this gap, an integrative theoretical framework is proposed to explain the processes involved in categorizing products as green. An integrative framework is necessary to spur further research and advance knowledge on this particular topic. Drawing from theories on schema categorization (Cohen and Basu, 1987; Komatsu, 1992), we contend that consumers' lay theories guide the categorization process as well as consumers' attention to the presented attributes and their interpretation. Finally, a research agenda is proposed.

## 2. Method

An integrative review of studies examining consumers' categorization of eco-friendly products was conducted (Snyder, 2019). First, the Web of Science and Science Direct databases were scanned on December 2021 with an exploratory search string (package\* and (cue or attribut\*) and (sustainab\* or organic\* or green or eco or environment\*)) without any restriction by language, time period, or type of document. This search yielded 1405 records. Titles and abstracts were examined, and documents meeting the inclusion criteria were selected for further analysis. A paper was included (1) if it focused on iconic cues and (2) on consumer goods (3) in a sample of consumers and (4) when green assessment or assessment of eco-friendliness was one of the outcome variables in the study. The consumer goods industry was chosen because the role of visual elements is essential for decision-making. Consumers typically follow a low-involvement decision-making process and rely more on visual cues (Silayoi and Speece, 2007). We only included journal papers in English, Spanish, French or Italian. Studies examining only the interpretation of indexical cues such as eco-labels (Eldesouky et al., 2020) or eco-claims (Lunardo and Saintives, 2013) were excluded.

Only 11 papers met the inclusion criteria. The limited number of papers is not surprising given that, as we said, the categorization of green products is an underexamined topic in the literature. Each paper was read in its entirety, and the initial analysis showed that packaging-related cues were studied. We grouped these cues into five categories: color, imagery, material, origin, and vendor or brand characteristics.

To expand the pool of studies, searches with other search strings were carried out in the same two databases (see the supplementary file, Table S1). Following the same procedure described above, two papers were retained. Finally, this initial sample of 13 papers was supplemented with cross-references (Thome-Ortiz, 2016). Thirteen journal papers referenced by the other included papers were added. With these additions, 26 papers (29 studies) composed the final sample.

Empirical papers ( $n = 21$ ) were coded for the attributes analyzed, countries, methods used, sample size, product type, and findings. Conceptual or review papers ( $n = 5$ ) were not coded, but their conclusions were included in the findings. In the supplementary file, Table 2 compiles the coded empirical papers.

Two-thirds of the papers (17 out of 26) were published in the last five years, which shows the increasing interest in the topic and in the variety of journals covering it (see the supplementary file, Tables S3 and S4). Most studies focused on a particular product, be it food (13) or cleaning or beauty products (9); 9 studies examined a generic consumer product. Color (9), materials (8), origin (6), vendor characteristics (5), and imagery (4) were the attributes most analyzed separately. Quantitative methods were primarily used, mainly experiments (16) followed by surveys (6). Additionally, interpretive methods (5), mixed method (1), and free choice profiling (1) were used.

## 3. Results

The synthesis of existing evidence is organized into two subsections: first, the cues used by consumers to assess product greenness

are presented; second, the theories and methods used in past studies are briefly described.

### 3.1. Cues used by consumers to assess product greenness

Consumers consider product greenness based on five iconic cues or product attributes. The results are coincident across methods and countries (see a visual summary in Fig. 1), which attests to the robustness and generalizability of the findings.

Six studies also examined how consumers interpret environmental claims alongside iconic cues. These are identified with an asterisk (\*) in Fig. 1; details are provided in Table S2 in the Supplementary file and are explained in Section 3.1.6.

#### 3.1.1. Packaging color

Consistent findings across methods (experiments, surveys, and interpretive) and countries (from the US to different European countries and South Africa) lead to the conclusion that products with earth-colored packaging (i.e., green, white, or brown) are perceived as eco-friendlier than products with bright-colored packaging (e.g., red) (e.g., Herbes et al., 2020; Magnier and Schoormans, 2017).

This finding is attributed to the fact that universally “earth” colors symbolize nature and therefore activate impressions of sustainability (Labrecque and Milne, 2013). The color green has long been used as a marketing tool to depict “environmental friendliness”; for this purpose, it has become “embedded in the schema of environmental responsibility” so that it triggers perceptions of eco-friendliness (Pancer et al., 2017). In contrast, bright colors evoke “strength,” and inferences of strength correlate negatively with sustainability perceptions (Magnier and Schoormans, 2017).

Recent studies have examined which of these earth colors better conveys the notion of greenness (Samaraweera et al., 2021). Comparing green and white packaging, this study showed that a green color might perform better than gray/red but can convey eco-friendliness less than white. Other studies (Pancer et al., 2017; Seo and Scammon, 2017) did not include white packaging in their stimuli.

#### 3.1.2. Packaging imagery

Imagery comprises images and photographs depicted on the packaging. Nature-related imagery was examined in three studies that used different stimuli and reached contradictory conclusions. Magnier and Crié (2015) concluded that “Photographs – e.g., Trees, leaves, meadows ...” and “Images – e.g., Terms or symbols inherent to the protection of the environment, hand-made drawings ...” evoke eco-friendliness. Similarly, Steenis et al.’s (2017) experiment concluded that nature imagery drove perceptions of eco-friendliness. However, contrary to previous results, a recent study (Samaraweera et al., 2021) compared two forms of nature-related imagery (flowers vs. leaves) versus no images. They found that consumers did not interpret flowers or leaves as cues of greenness. This contradictory evidence shows that it is unclear which imagery features are crucial to driving greenness perceptions.

#### 3.1.3. Packaging material

This is one of the fundamental cues used by consumers to categorize a product as environmentally friendly (Dam, 1996): consumers almost exclusively refer to the packaging material when they are asked to freely report what attributes they pay attention to when assessing the eco-friendliness of products (Dam, 1996; Magnier and Crié, 2015). Moreover, packaging materials shape not only green perceptions but also judgments of taste and quality (Steenis et al., 2017).

Although each study is based on different material types and heterogeneous methods have been used in different studies, some robust conclusions can be extracted. Findings show that plastic and metal are usually categorized as less green (e.g., Magnier and Crié, 2015) and paper and glass as greener (Lindh et al., 2016; Steenis et al., 2017).

Some differences were observed across countries. Herbes et al. (2018), in their multicountry study, concluded that Germans take more into account the material itself (and the associated environmental impacts) to make a green assessment compared to French and North Americans, who mainly focus on the potential recyclability of packaging material.

Consumers’ evaluation of the environmental superiority of paper and glass is explained in these studies as reflecting consideration of

Packaging color	Packaging imagery	Packaging material	Origin	Vendor characteristics
Earth-color (i.e., green, white, or brown) packaging conveys eco-friendliness.	Packaging with nature-inspired imagery (e.g., landscape) conveys eco-friendliness.	Recyclable biodegradable and reusable packaging and paper or glass convey eco-friendliness.	Local production/origin conveys eco-friendliness.	Small firms, rounded brand logos, and silent consonants in brand names convey eco-friendliness.
Herbes et al. (2020); Ketelsen et al. (2020); Labrecque et al. (2013); Magnier & Crié (2015)*; Magnier & Schoormans (2017)*; Pancer et al. (2017) S2A & S3*; Samaraweera et al. (2021) S2; Scott & Vigar-Ellis (2014); Seo & Scammon (2017) S1 & S2*	Ketelsen et al. (2020); Magnier & Crié (2015)*; Samaraweera et al. (2021) S2; Steenis et al. (2017)	Boz et al. (2020); Dam (1996); Herbes et al. (2018); Herbes et al. (2020); Ketelsen et al. (2020); Lindh et al. (2016); Magnier & Crié (2015)*; Magnier & Schoormans (2017)*; Nguyen et al. (2020); Scott & Vigar-Ellis (2014); Steenis et al. (2017)	Autio et al. (2013); Bazzani & Cannavari (2017); Carroll & Fahy (2014); Feldmann & Hamm (2015); Lazzarini et al. (2017)*; Ostrom (2006); Smithers et al. (2008)	Joshi & Kronrod (2020) S1 & S4; Meiting & Hua (2021) S2; Scekic & Krishna (2021); Wood et al. (2018) S1*
No bearing on actual environmental footprint	No bearing on actual environmental footprint	Partial bearing on existing environmental footprint	Partial bearing on existing environmental footprint	No bearing on actual environmental footprint

Fig. 1. Delineation of the cues used by consumers.

Note: The following references appear in Fig. 1 and not in the text: Boz et al., 2020; Carroll and Fahy, 2015; Ketelsen et al., 2020; Scott and Vigar-Ellis, 2014; Smithers et al., 2008.

the last stages of the product life cycle only. However, the sustainability of materiality is also affected by the environmental impacts occurring during extraction, production, and transportation processes. When consumers' green assessment is compared with the objective environmental performance of these materials, using life cycle assessment (LCA) (Dam, 1996; Steenis et al., 2017), consumers seem to overemphasize a portion of materials' environmental impacts (recyclability, biodegradability, and reuse rate) while disregarding the first stages of the life cycle. To illustrate, consumers believe that glass is one of the most environmentally friendly materials, whereas LCA shows the opposite (Steenis et al., 2017). These authors, in addition, refer to lay beliefs as a tentative explanation for explain why consumers make assessments that are not aligned with the actual environmental footprint of the product ("consumers rely on their own lay beliefs and can be easily misled by salient cues") (p. 26).

### 3.1.4. Origin

For consumers, origin encompasses production location (local, regional, national, overseas) and country of origin (Feldmann and Hamm, 2015). However, "local" seems to be phenomenologically assessed by consumers, and a standardized local label does not exist (Feldmann and Hamm, 2015). Nevertheless, studies typically use objective measures of localness based on the distance between producer and (i.e., miles or kilometers) or political boundaries (e.g., states, provinces, countries) (Feldmann and Hamm, 2015). Consumers believe that locally grown products are green (Feldmann and Hamm, 2015; Lazzarini et al., 2017). Moreover, products produced using traditional, "crafty," manual, or nonindustrial methods or emphasizing "freshness" and "naturalness" (i.e., pesticide-free) (e.g., Autio et al., 2013; Bazzani and Canavari, 2017) are also perceived as green even when they are produced farther away.

LCA studies partly corroborate this belief: local food products are more environmentally friendly than imported products, mainly due to the transport mode and distance (Jungbluth et al., 2000; Stoessel et al., 2012). However, choosing local products is insufficient to ensure the low environmental impact of a consumed food (Röös and Karlsson, 2013). The product category (Jungbluth et al., 2000), seasonality (Stoessel et al., 2012), and farming system (e.g., Meier et al., 2015) also determine the food's environmental footprint. For instance, domestic vegetables and fruits are only the most environmentally friendly option when they are in season and are produced using environmentally friendly production systems. Lazzarini et al. (2017) attributed these results to consumers using the "our own country is best" heuristic and stressed that although consumers' heuristic may result in accurate sustainability estimations, it can also result in systematic mistakes regarding sustainability assessment.

### 3.1.5. Vendor characteristics

In past studies, brand size, brand visuals (shape of brand logos) and auditory features (brand names) have been examined as cues of greenness. Regarding brand size, niche brands—small brands with a green product portfolio—are perceived as eco-friendlier (Scekic and Krishna, 2021; Wood et al., 2018). Products from large corporations are considered less green than those produced by niche companies. This perception is said to be driven by two beliefs. First, the lay belief in the Omnivore's Dilemma (Pollan, 2009)—the belief that there is tension between the logic of nature and the logic of human industry—explains why many consumers believe that a large company cannot have sustainability commitments to the same extent as a small business. Second, the zero-sum thinking about the product's efficacy trade-off, a vestige of greenwashing (Nyilasy et al., 2014), may also guide the use of this cue. Zero-sum thinking explains that consumers weigh multiple attributes when categorizing a product, and some can be in tension, for example, attributes related to product performance and attributes associated with the social good of the product (Lin and Chang, 2012; Luchs et al., 2010). Forty-one percent of consumers believe that environmentally friendly products are less effective than regular products (Pickett-

Baker and Ozaki, 2008). When a company intentionally makes an environmentally friendly product, consumers assume that resources are taken away from product quality and are therefore less likely to purchase the product when the environmental benefit is not a priority (Newman et al., 2014). In parallel, in the 1990s, some companies adorned their packages with (sometimes spurious) green claims (Wood et al., 2018); the superficiality of many products touted as green became apparent to consumers, which produced a backlash against greenwashing. Therefore, when consumers contrast performance and environmental claims, they may attribute to large vendors a greenwashing intention and discount the credibility of the green attribute (Wood et al., 2018). In sum, because consumers "cannot believe that large corporations can achieve the level of environmentalism that is possible for smaller operations" (Wood et al., 2018, p. 8), they interpret small company size as a cue of greenness.

Scholarship on inferences from brand size also shows that small companies are perceived as more socially responsible (Green and Peloza, 2011; Yang et al., 2020). Similarly, studies examining perceptions of local food have shown that products sold by small, independent producers are also perceived as eco-friendlier even though they may be located at a greater distance from the consumer (e.g., Granvik et al., 2017; Ostrom, 2006). This is due, as stated above, to consumers' conflation of the attributes of a product as local, traditional, sold by small producers, and eco-friendly.

The shape of brand logos is used as a cue about product eco-friendliness; rounded brand logos convey product greenness better than squared logos (Meiting and Hua, 2021). This judgment occurs in low-involvement green products where consumers do not allocate too many cognitive resources to process information and trust peripheral cues more when assessing the products (Atkinson and Rosenthal, 2014; Sengupta et al., 1997). The shape of logos acts as a heuristic cue about the product, and rounded logos operate subtly to communicate greenness. One possible explanation is that the association between a rounded shape and greenness might intrinsically exist in human intuition (Meiting and Hua, 2021). Women are stereotypically thought to be warmer than men; thus, feminine attributes (such as a round shape) symbolically convey the idea of caring (Meiting and Hua, 2021; Slepian and Galinsky, 2016) and, by extension, greenness.

Similarly, brand names' auditory features convey the eco-friendliness of the brand via metaphorical associations (Joshi and Kronrod, 2020). Silent consonants in brand names (e.g., /k/, /p/, /t/), in contrast to voiced consonants (e.g., /b/, /d/, /g/), are more effective in suggesting environmental friendliness because silent consonants relate to human characteristics (e.g., good-heartedness, purity or honesty) that are metaphorically identified with environmental friendliness.

### 3.1.6. Combination of cues

Although most of the studies examined one isolated cue, it is worth mentioning that three papers (Herbes et al., 2020; Magnier and Crié, 2015; Samaraweera et al., 2021) examined a combination of two cues. Although these studies did not discuss how these cues combine to produce a final greenness assessment, their approach provides conclusions about the interaction of some cues. Herbes et al. (2020) concluded that French consumers rely more on packaging color and material to categorize products as green. Magnier and Crié (2015) found that consumers considered green products to be those with earth-colored packaging, packaging or logos with natural imagery, and recyclable, biodegradable, or reusable packaging materials. Samaraweera et al. (2021) established that nature-related imagery on packaging does not influence the overall eco-friendliness assessment; only color labels influence this perception.

Six studies included indexical and iconic cues and studied how consumers interpret greenness (see Table S2 in the supplementary file). The findings of these studies show that consumers look for congruency between some iconic cues such as color and packaging materials and indexical cues; to illustrate, when a green color and an eco-label are displayed together, consumers overcome the ambiguity and are better



able to categorize a product as green (Magnier and Schoormans, 2017; Pancer et al., 2017; Seo and Scammon, 2017). Thus, fluency or congruity among cues (Lee and Labroo, 2004) seems to be relevant for the categorization of the greenness of a product (Magnier and Crié, 2015). However, there are other cues, such as origin (Lazzarini et al., 2017) and brand size (Wood et al., 2018 S1), where congruency with eco-label is not fundamental to assess the product as green; in fact, the diagnosticity of these cues seems greater than the diagnosticity of the eco-label: local/national products are perceived as more sustainable regardless of the environmental claim, and products sold by niche brands are assessed as greener than products sold by non-niche brands regardless of environmental claim.

In sum, past scholarship shows that consumers pay attention to cues that have limited bearing on the environmental footprint of products, such as packaging color or imagery. Because cues seemingly irrelevant to assessing eco-friendliness are used, consumers may perpetuate confident choices in believing that these purchases are green. Indeed, studies have found that there is a positive relation between the green perception of products and purchase intent (Lee et al., 2020), although other variables (i.e., green perceived value, green perceived risk, product availability, consumer motivation, consumer literacy) (Chen and Chang, 2012; Rokka and Uusitalo, 2008) may also influence the final purchase. However, evidence in this regard is inconclusive. Nguyen et al. (2020) explored consumer purchase behaviors in six focus groups in Vietnam, concluding that price is a barrier to buying eco-friendly products, as consumers demand the same price as for noneco-friendly alternatives. However, in Sweden, Lindh et al. (2016) affirmed, through a survey, that 86 % of Swedish consumers are willing to pay more for eco-friendly packaging. Table S2 identifies these two studies.

To conclude, it goes without saying that it is misguided to categorize a product as green based on earth-colored packaging or designs with natural landmarks and animal imagery since packaging design has no bearing on the product's environmental footprint. Similarly, the logo shape, the letters of a brand, or the company size have little relationship with the actual greenness of a product. Moreover, consumers incorrectly assess glass and paper as the most environmentally friendly packaging material, whereas life cycle assessments (LCAs) show that metal is eco-friendlier than what consumers believe (e.g., Dam, 1996; Herbes et al., 2018). Regarding origin, consumer categorization is partly consistent with LCA showing that local products are eco-friendlier than imported products, mainly due to fewer resources used in the transportation phase (Lazzarini et al., 2017). However, in the case of food, product category, seasonality, and farming system significantly affect its greenness and need to be considered to establish whether local implies greener (Lazzarini et al., 2017). However, consumers do not seem to use these cues to make eco-friendliness assessments.

### 3.2. Review of theories and methods

After examining the theories used in existing papers (only ten papers draw from a theory), we classified them depending on the focus of inquiry into theories concerning “what” product attributes consumers look at to make the overall judgment and “how” consumers interpret these cues to make the overall judgment (Fig. 2). Table S2 depicts a detailed compilation of theories found in past studies.

#### 3.2.1. Theories on “what” consumers look at to make the judgment

To explain “what” consumers look at, cue utilization theory (Olson and Jacoby, 1972; Olson, 1978) has been predominantly used. According to this theory, a product is a bundle of cues. Consumers ascertain and evaluate material and/or symbolic cues (e.g., color, logo shape, or brand name) based on the cues' predictive and confidence values (Olson and Jacoby, 1972). The predictive value of cues is the degree to which cues are perceived to be associated with specific benefits (e.g., sustainability or taste). In contrast, the confidence value is the degree to which consumers are confident in making accurate judgments

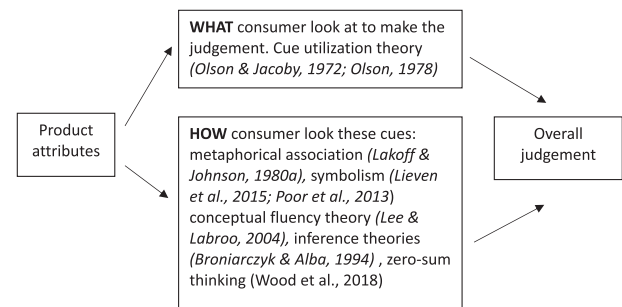


Fig. 2. Theoretical foundations of the studies.

based on these available cues. Consumers interpret product attributes as cues and use them to make inferences or form a judgment of the product (Olson, 1978), such as their eco-friendliness.

Four studies explicitly refer to cue utilization theory; however, in one of them, although the theory is mentioned, the hypotheses are not deductively based on it (Herbes et al., 2020). In the other two (Pancer et al., 2017; Steenis et al., 2017), research questions are elaborated based on the theory. The remaining studies (13) draw implicitly on cue utilization theory, although they ground the research on theories regarding “how,” as described next.

#### 3.2.2. Theories on “how” consumers make inferences from these cues

Different theories have been used to explain “how” consumers make inferences from these cues. Five studies explicitly refer to metaphor theories, four studies to symbolism theories, one study to conceptual fluency, and one study to zero-sum thinking. Six studies explicitly refer to inference theory. However, although the theories are mentioned in one of these studies, hypotheses are not deductively based on the theory (Magnier and Schoormans, 2017). Several studies draw from more than one theory.

Metaphor associations theory (Lakoff and Johnson, 1980) describes how humans naturally associate meanings embedded in our mind with an expected meaning about objects to make an overall judgment of the objects. Similar to metaphor theory are symbolism theories. According to these theories, consumers use cues (e.g., sounds, colors, images, the logo's shape) as symbols when making a judgment. To illustrate, color symbolism (Labrecque and Milne, 2013) shows that consumers use color attributes inherent to the stimulus to automatically produce physiological responses (e.g., red color activates arousal). The same can be said for image symbolism (Poor et al., 2013), where images also affect overall judgment, or shape symbolism (Lieven et al., 2015), where the physical shape of an object also drives the perception of psychological characteristics or psychological characteristics are inferred from the physical shape of objects. To illustrate, the shape of green brand logos might influence consumers' green perception through the mediation of feminine stereotyping. Women are stereotypically thought to be warmer than men, so feminine attributes are considered more appropriate for green brands as they evoke “care” (Meiting and Hua, 2021; Slepian and Galinsky, 2016). Therefore, the association between a rounded shape and greenness might intrinsically exist in human intuition (Meiting and Hua, 2021), with a rounded shape symbolically conveying greenness. To conclude, metaphorical thinking or symbolic thinking explains why the identified cues are interpreted as representing greenness: they do so because these cues are associated with notions of caring or naturalness.

Relatedly, conceptual fluency theory (Lee and Labroo, 2004) highlights the relevance of the ease with which the meaning of information comes to mind. The more fluent or congruent a salient attribute is with the green concept held by consumers, the more quickly consumers will focus their attention on it and interpret the attribute as a cue of greenness. For instance, conceptual fluency can be achieved by priming

people with a conceptually related construct, which can lead to more favorable evaluations of the subsequently presented target construct. In this case, conceptual fluency between being round and caring may explain why consumers perceive brands with rounded brand logos as greener (Meiting and Hua, 2021).

Complementing these arguments, inference theory (Broniarczyk and Alba, 1994) demonstrates that in the absence of complete information, consumers make inferences from the information available that they have to make the overall judgment. More specifically, inference theory explains how consumers “fill in” missing information about product attributes by relying on other product attributes (Broniarczyk and Alba, 1994). In this case, consumers would base their overall judgment on inferences from selected cues. For instance, consumers would assess the overall environmental performance based on a single cue such as a packaging color, even though this inference may be inaccurate. Finally, the theory of zero-sum thinking (Wood et al., 2018) has been applied to explain the cognitive tensions or ambivalence observed between beliefs of product performance and eco-friendliness.

In summary, our limited understanding of why consumers use the seemingly irrelevant cues outlined in Section 3.2 is due to the “atheoretical” approach in half of the studies. Additionally, the methods used in past studies may explain why past scholarship does not fully explain the processes used by consumers to categorize products as green. Most past studies have used experiments (16) or surveys (6). A minority of studies have used interpretive (5), mixed (1), and free choice profiling methods (1) (supplementary file, S1). These experiments explain a causal relationship between the use of a cue and a green assessment but have fallen short of explaining why this causal relationship exists. Other studies using surveys and interpretative methods have expanded our knowledge by explaining the perceptions triggered by particular cues and how these perceptions result in an overall green assessment. Nevertheless, this approach is limited, as it does not provide a complete account of how and why consumers categorize a product as green.

#### 4. Discussion

This study synthesized the five iconic cues that consumers use to assess a product's eco-friendliness: color, imagery, packaging materials, origin, and brand characteristics. Consumers interpret these cues as diagnostic of greenness, whereas diagnosticity refers to a cue's perceived reliability in discriminating between alternative categorizations (Richardson et al., 1994).

The review shows that the literature has fallen short of explaining why consumers pay attention to these seemingly irrelevant cues and what psychological process guides the categorization process. On the one hand, our limited understanding of the green categorization process is due to the predominant atheoretical approach in half of the studies. On the other hand, studies built on individual theories assessing individual cues do not comprehensively and holistically explain the process implicated in the categorization process. Additionally, our synthesis of past work unveils contradictory and incomplete findings (especially regarding the diagnosticity of specific colors or nature-related imagery). An examination of the conditions that moderate the mechanisms involved in this categorization process is also missing. Therefore, existing evidence does not provide a complete answer to the issue of green categorization.

We outline an integrative theoretical framework drawing from schema categorization theory to provide a more integrative explanation of how consumers categorize products as green (Cohen and Basu, 1987; Komatsu, 1992). According to categorization theories, cue diagnosticity is assessed based on consumers' concepts or mental representations of categories stored in memory (Hutchinson and Alba, 1991; Komatsu, 1992). A consumer category is a set of products, services, or other marketing entities or events that appear, to the consumer, related in some way (Loken et al., 2008). The most accepted theory to explain how abstract entities such as “green products” are categorized is schema theory

(Cohen and Basu, 1987). A schema is an abstract mental structure that provides a consistent representational structure for abstracted information and information about instances (Medin and Smith, 1984). Consumers first create a schema about product categories (Komatsu, 1992), store it in memory (Loken, 2006), and then use it to make evaluative judgments (Cohen and Basu, 1987; Ratneswar et al., 1996).

This schema is modulated by lay theories (Medin, 1989) or implicit associations that can be defined as the individuals' understanding of the deeper structure of objects and events (Medin and Smith, 1984; Niedenthal et al., 1999; Wattenmaker et al., 1988). To illustrate, “immigrants steal jobs” or “immigrants abuse the welfare system” are lay theories that shape the schema held of immigrants (Boyer and Petersen, 2018); similarly, consumers believe that if the package is slim, then the brand is high-end, following a lay theory about a person's body shape and their socioeconomic status (Chen et al., 2020). Beyond its influence on schema formation, lay theories are implicated in inference-making processes (Furnham, 1988). Based on this, we propose the following integrative conceptual framework (Fig. 3).

Our model is based on four fundamental propositions. Consumers hold a schema of what can be counted as a “green product”; this schema has been an unmeasured construct in past studies. However, this is a crucial construct since the green product schema determines which attributes are considered diagnostic cues of greenness (P1) (e.g., green color). Consumers thus will pay attention to these diagnostic attributes (Fig. 1) to categorize the product as green.

Lay theories modulate the formation of this green product schema (P2). If consumers believe that earth-colored packaging signals eco-friendliness, this is because lay theory has shaped this schema. A potential lay theory that needs to be empirically tested could be “if it reminds me of nature, then it is greener.”

Lay theories are used to formulate heuristics (P3). Lay theories and heuristics are separate constructs. Lay theories are informal or common-sense explanations that people use in their everyday lives to make sense of their world, and they usually involve causal knowledge structures (if-then) (Furnham, 1988); in contrast, heuristics can be defined as “cognitive shortcuts that enable individuals to make evaluations on the basis of one or a few simple rules or cues, thereby avoiding the processing and time costs related to exploring an exhaustive set of possibilities” (Marsh, 2002, p. 49). It is important to remark that heuristics are formulated to enable fast and frugal decision-making (Gigerenzer and Gaissmaier, 2011). Lay theories have been found to be antecedents of heuristics (Cheng et al., 2017; Gomez, 2013; La Maccia et al., 2016), so that these shortcuts are formulated on the basis of the beliefs a person holds.

More specifically, lay theories and heuristics can be differentiated across three dimensions: their number and scope and their degree of consciousness. Lay theories are limited and consistent across situations (Furnham, 1988), whereas heuristics may be infinite and applicable to different domains. For example, the “hard work leads to success” lay theory leads to the formulation of a “cost–benefit” heuristic (Cheng et al., 2017) that is subsequently applied as cognitive shortcuts in many domains, such as consumption (e.g., a bad-tasting medicine is considered more effective) or workplace (e.g., if you put in the effort, you will get promoted). Second, lay theories are used unconsciously, and individuals struggle to articulate them (Furnham, 1988), whereas heuristics can be used both consciously and unconsciously (Gigerenzer and Gaissmaier, 2011). To illustrate, Folkes and Matta (2013, p. 19) empirically demonstrated the lay theory that “gender expresses itself in a person's output against experiential evidence,” which is the antecedent of manifold heuristics such as women being worse drivers than men or women being lost more often than men (Armstrong and Nelson, 2005). Whereas individuals may report the latter belief or heuristic, the lay theory on which this heuristic is based is less accessible to the conscious mind.

Past work has suggested that the use of heuristics may explain why consumers categorize products as green. We claim that a focus on lay

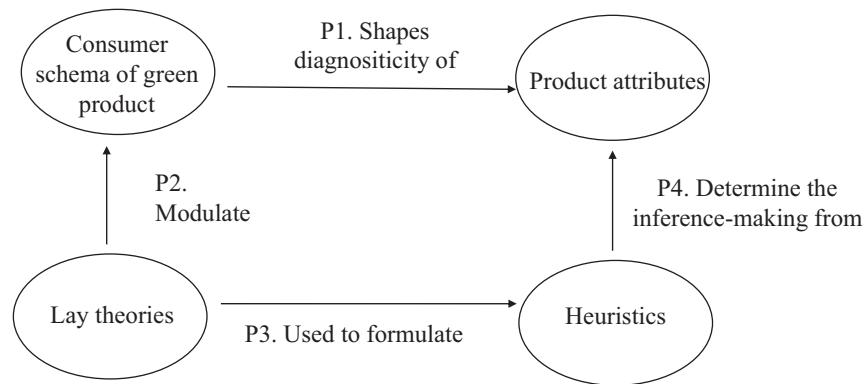


Fig. 3. Integrative conceptual framework of eco-friendly consumer goods categorization in the absence of indexical cues.

theories provides a higher-order explanation (Komatsu, 1992) for these heuristics. For example, the “small = green” heuristic proposed by Wood et al. (2018) could emanate from a general lay theory of group size (La Macchia et al., 2016), where small groups are considered trustworthy and benevolent, warm, easier to influence, more cohesive and cooperative. Therefore, this lay theory may allow consumers to formulate a set of heuristics so that the size of a group/brand is used as a fast and frugal shortcut to categorize a product as green. In other words, whereas the lists of heuristics used by consumers in green product categorization may be infinite (e.g., craftsman = green, Judge et al., 2020; local = green Lazzarini et al., 2017), these heuristics or rules of thumb are anchored in a limited set of lay theories that provide the if-then content (Cho and Schwarz, 2008).

Moreover, heuristics are based on metaphors and symbols, as shown in Section 3.2. To illustrate, the packaging color provides a heuristic that helps quickly categorize the product as green. Earth colors are a symbol of nature, and what reminds us of nature is considered greener (Steinhart et al., 2014). Thus, the lay theory “if it reminds me of nature, then it is greener” determines that earth colors form part of the green product schema and provides a heuristic that assists in interpreting the product attributes and making a quick categorization (if it has an earth-colored packaging, then it is green). Thus, lay theories directly or mediated by heuristics determine or guide the inferences made by consumers when interpreting product attributes (P4).

Building on this integrative conceptual framework, a research agenda is presented around seven themes grouped into two blocks, namely, (1) Lay theories and (2) Attributes. Each of these research themes is explained in turn (see the summary in Table 1).

The first block of research questions revolves around questions on lay theories. First, future empirical work should empirically identify the lay theories influencing consumers’ assessment of eco-friendliness. Research on how lay theories influence consumers’ decision-making is

scant, and the bulk of research examines the influence of lay theories on health choices (Raghunathan et al., 2006). However, it is relevant to know which lay theories guide the categorization of products as green, especially for policy-making against greenwashing: if manufacturers’ tapping into these lay theories may lead consumers to make an inaccurate green assessment (Deval et al., 2016). Therefore, policy-makers are called to educate consumers to avoid misinterpretations and set clear rules for the industry. If lay theories are repeatedly activated, their salience increases as they are more accessible to individuals (Levy et al., 2006) and thus will be increasingly used, thus perpetuating a vicious cycle. It is also relevant for consumers to be equipped with this understanding, which may help them to make better decisions.

As a second avenue for future research, we propose to examine how eco-friendliness lay theories are formed. Lay theories emerge as a result of four different processes: induction or experience; construction or inference and deductions from observations; analogy or extrapolation from specific encounters; and authority or acceptance of ideas from others (Furnham, 1988). Future work should focus on these processes and study the origins of lay theories and how they are developed, as the variables relevant to their construction may be distinct from one context to another (Deval et al., 2016).

Third, complementing this, future work should examine when people rely more or less on sustainability-related lay theories. Existing evidence shows that individuals’ reliance on lay theories is greater when their prior knowledge is limited (Haws et al., 2017). Lay theories are also more likely to be in operation when individuals have limited time and/or dedicate little search effort to choosing a brand or product (Chen et al., 2020). Furthermore, reliance on lay theories is higher when the activated lay theory matches the stimulus message; in this case, consumers’ product perceptions tend to be more favorable compared to the situation where the lay theory and the stimulus are mismatched (Haws et al., 2017; Steinhart et al., 2014). Thus, the less prior knowledge, the less time, and the higher match between lay theory and the stimulus message, the higher reliance on lay theory. These insights from other domains should be confirmed in the context of this study.

Finally, future work should test effective interventions to halt the inaccurate categorization of green products. For example, in the experiment reported by Ferrara et al. (2020), most consumers were open to considering an eco-friendly packaging material once they were informed about its environmental footprint and reassured that this material had no negative bearing on the organoleptic qualities of the product. Thus, studying the design of consumer education initiatives that can deactivate the reliance on lay theories in green product categorization is a matter of further research.

Concerning attributes, three future inquiry lines are proposed. First, we recommend deepening the study of cues to obtain more evidence about what product attributes are found to be diagnostic of

Table 1  
Future research lines.

Lay theories	Empirically identify the lay theories modulating the formation of green consumer product schema. Explicate how eco-friendliness lay theories are formed. Establish under which circumstances consumers are more (less) reliant on sustainability-related lay theories to make this assessment. Test effective interventions to halt the inaccurate categorization of green products.
Attributes	Disambiguate conflicting findings regarding color and nature-related imagery. Identify other attributes that may be considered diagnostic of product greenness. Examine how different cues combine to make an overall assessment and the psychological mechanisms followed to resolve contradictions among cues.



eco-friendliness. For example, the diagnosticity of packaging colors is unclear since some studies find that green color is more diagnostic than gray/red but is less able to convey greenness when compared to white (Samaraweera et al., 2021). Therefore, is white the new green? Similarly, regarding the nature-imagery features shown in Subsection 3.1.2, it is still unclear which nature-related images are associated with eco-friendlier perceptions, as studies have found contradictory evidence (Pancer et al., 2017; Samaraweera et al., 2021).

Not only is it necessary to resolve past contradictory evidence but also to determine whether other attributes may be considered diagnostic. For instance, packaging size has gone unexamined. Beyond packaging cues, other perceptual cues in communication stimuli, such as the background used in advertisements (urban background vs. natural landscapes), could affect the greenness assessment. Similarly, further work could study whether other concepts such as “natural” or “healthy” and the cues used to assess them may also affect the categorization of green products (Etale and Siegrist, 2021).

Third, future work should study how different cues combine to make an overall assessment. Products have multiple attributes (Orth and Malkewitz, 2008), but most past studies have only examined one of these attributes simultaneously, thus failing to explain how different cues are integrated to make an overall judgment. As a result, we ignore which attributes consumers prioritize to assess product greenness. Drawing on centrality theory (Gershoff and Frels, 2015; Sloman et al., 1998), future work should discern whether there is a central attribute that conditions the assessment (Veryzer, 1999). Additionally, a future line of inquiry should focus on how weights are assigned to each attribute depending on its association with the category (Cohen and Basu, 1987; Loken et al., 2008).

Moreover, more evidence is needed to understand how the green assessment is affected by contradictory iconic cues and how consumers assess the product's greenness when faced with contradictory indexical and iconic cues. It is also key to understand whether some irrelevant cues are more diagnostic than others, as this may serve as the basis to set clear rules for the industry to prevent greenwashing.

## 5. Conclusion

This literature review provides theoretical and practical implications. Regarding the theoretical implications, the proposed integrative theoretical framework could inspire further research to advance our knowledge of consumers' categorization of products as green. Extending this line of research is also necessary for regulators and policy-makers who, building on this knowledge, can design consumer education campaigns that enable product choices with lower environmental footprints. Policy-makers can also promote good industry practices and design policies that set clear rules for the industry to avoid greenwashing; indeed, there is high potential for greenwashing insofar as producers may match their packaging design to consumers' lay theories to favor an inaccurate categorization. This review also provides valuable insights for consumer and sustainable consumption educators to commit to ethical practices and can help consumers to avoid misperceptions of environmentally friendly products.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.spc.2022.10.005>.

## References

- Armstrong, C.L., Nelson, M.R., 2005. How newspaper sources trigger gender stereotypes. *J. Mass Commun.* 2 (4), 820–837. <https://doi.org/10.1177/107769900508200405>.
- Atkinson, L., Rosenthal, S., 2014. Signaling the green sell: the influence of eco-label source, argument specificity, and product involvement on consumer trust. *J. Advert.* 43 (1), 33–45. <https://doi.org/10.1080/00913367.2013.834803>.
- Autio, M., Collins, R., Wahlen, S., Anttila, M., 2013. Consuming nostalgia? The appreciation of authenticity in local food production. *Int. J. Consum. Stud.* 37 (5), 564–568. <https://doi.org/10.1080/00913367.2013.834803>.
- Bangsa, A.B., Schlegelmilch, B.B., 2020. Linking sustainable product attributes and consumer decision-making: insights from a systematic review. *J. Clean. Prod.* 245. <https://doi.org/10.1016/j.jclepro.2019.118902>.
- Bazzani, C., Canavari, M., 2017. Is local a matter of food miles or food traditions? *Ital. J. Food Sci.* 29 (3), 505. <https://doi.org/10.14674/IJFS-733>.
- Boyer, P., Petersen, M.B., 2018. Folk-economic beliefs: an evolutionary cognitive model. *Behav. Brain Sci.* 41. <https://doi.org/10.1017/S0140525X17001960>, e158.
- Boz, Z., Korhonen, V., Koelsch Sand, C., 2020. Consumer considerations for the implementation of sustainable packaging: a review. *Sustainability* 12 (6), 2192. <https://doi.org/10.3390/su12062192>.
- Broniarczyk, S.M., Alba, J.W., 1994. The role of consumers' intuitions in inference making. *J. Consum. Res.* 21 (3), 393–407. doi:0093-5301/95/2103-0001.
- Carroll, B.E., Fahy, F., 2015. Locating the locale of local food: the importance of context, space and social relations. *Renew. Agric. Food Syst.* 30 (6), 563–576. <https://doi.org/10.1017/S1742170514000404>.
- Cheng, Y., Mukhopadhyay, A., Schrieff, R.Y., 2017. Do costly options lead to better outcomes? How the protestant work ethic influences the cost–benefit heuristic in goal pursuit. *J. Mark. Res.* 54 (4), 636–649. <https://doi.org/10.1509/jmr.15.0105>.
- Chen, Y.S., Chang, C.H., 2012. Enhance green purchase intentions: the roles of green perceived value, green perceived risk, and green trust. *Manag. Decis.* <https://doi.org/10.1108/00251741211216250>.
- Chen, H., Pang, J., Koo, M., Patrick, V.M., 2020. Shape matters: package shape informs brand status categorization and brand choice. *J. Retail.* 96 (2), 266–281. <https://doi.org/10.1016/j.jretai.2019.08.003>.
- Cho, H., Schwarz, N., 2008. Of great art and untalented artists: effort information and the flexible construction of judgmental heuristics. *J. Consum. Psychol.* 18 (3), 205–211. <https://doi.org/10.1016/j.jcps.2008.04.009>.
- Cohen, J.B., Basu, K., 1987. Alternative models of categorization: toward a contingent processing framework. *J. Consum. Res.* 13 (4), 455–472. <https://doi.org/10.1086/209081>.
- Costa, C.S.R., da Costa, M.F., Maciel, R.G., Aguiar, E.C., Wanderley, L.O., 2021. Consumer antecedents towards green product purchase intentions. *J. Clean. Prod.* 313, 127964. <https://doi.org/10.1016/j.jclepro.2021.127964>.
- Dam, Y.K.V., 1996. Environmental assessment of packaging: the consumer point of view. *Environ. Manag.* 20 (5), 607–614. <https://doi.org/10.1007/BF01204134> (New York).
- Deval, H., Cronley, M.L., Mantel, S.P., Kardes, F.R., 2016. Naïve theories about marketing and consumption in consumer inference. *Routledge International Handbook of Consumer Psychology*. Routledge, pp. 447–464.
- Eldesouky, A., Mesias, F.J., Escibano, M., 2020. Perception of Spanish consumers towards environmentally friendly labelling in food. *Int. J. Consum. Stud.* 44 (1), 64–76. <https://doi.org/10.1111/ijcs.12546>.
- ElHaffar, G., Durif, F., Dubé, L., 2020. Towards closing the attitude-intention-behavior gap in green consumption: a narrative review of the literature and an overview of future research directions. *J. Clean. Prod.* 275. <https://doi.org/10.1016/j.jclepro.2020.122556>.
- Etale, A., Siegrist, M., 2021. Food processing and perceived naturalness: is it more natural or just more traditional? *Food Qual. Prefer.* 94, 104323. <https://doi.org/10.1016/j.foodqual.2021.104323>.
- Feldmann, C., Hamm, U., 2015. Consumers' perceptions and preferences for local food: a review. *Food Qual. Prefer.* 40, 152–164. <https://doi.org/10.1016/j.foodqual.2014.09.014>.
- Ferrara, C., Zigarelli, V., De Feo, G., 2020. Attitudes of a sample of consumers towards more sustainable wine packaging alternatives. *J. Clean. Prod.* 271. <https://doi.org/10.1016/j.jclepro.2020.122581>.
- Folkes, Valerie S., Matta, Shashi, 2013. When a product takes on characteristics of the person who created it: sometimes it sounds sweeter. *J. Consum. Psychol.* 23 (1), 19–35. <https://doi.org/10.1016/j.jcps.2012.01.006>.
- Furnham, A., 1988. Lay theories: everyday understanding of problems in the social sciences. Elmsford, In: Argyle, M. (Ed.), *International Series in Experimental Social Psychology*. Vol. 17, Elsevier, Oxford.
- Gershoff, A.D., Frels, J.K., 2015. What makes it green? The role of centrality of green attributes in evaluations of the greenness of products. *J. Mark.* 79 (1), 97–110. <https://doi.org/10.1509/jm.13.0303>.



- Gigerenzer, G., Gaissmaier, W., 2011. Heuristic decision making. *Annu. Rev. Psychol.* 62 (1), 451–482. <https://doi.org/10.1146/annurev-psych-120709-145346>.
- Gomez, P., 2013. Common biases and heuristics in nutritional quality judgments: a qualitative exploration. *Int. J. Consum. Stud.* 37 (2), 152–158. <https://doi.org/10.1111/j.1470-6431.2012.01098.x>.
- Granvik, M., Joosse, S., Hunt, A., Hallberg, I., 2017. Confusion and misunderstanding—interpretations and definitions of local food. (Basel, Switzerland) *Sustainability* 9 (11). <https://doi.org/10.3390/su9111981>.
- Green, T., Pellozo, J., 2011. How does corporate social responsibility create value for consumers? *J. Consum. Mark.* 28 (1), 48–56. <https://doi.org/10.1108/0736376111101949>.
- Hanss, D., Böhm, G., 2012. Sustainability is seen from the perspective of consumers. *Int. J. Consum. Stud.* 36 (6), 678–687. <https://doi.org/10.1111/j.1470-6431.2011.01045.x>.
- Haws, K.L., Reczek, R.W., Sample, K.L., 2017. Healthy diets make empty wallets: the healthy = expensive intuition. *J. Consum. Res.* 43 (6), 992. <https://doi.org/10.1093/jcr/ucw078>.
- Heijungs, R., Huppes, G., Guinée, J.B., 2010. Life cycle assessment and sustainability analysis of products, materials and technologies. Toward a scientific framework for sustainability life cycle analysis. *Polym. Degrad. Stabil.* 95 (3), 422–428. <https://doi.org/10.1016/j.polydegradstab.2009.11.010>.
- Herbes, C., Beuthner, C., Ramme, I., 2018. Consumer attitudes towards biobased packaging – a cross-cultural comparative study. *J. Clean. Prod.* 194, 203–218. <https://doi.org/10.1016/j.jclepro.2018.05.106>.
- Herbes, C., Beuthner, C., Ramme, I., 2020. How green is your packaging—a comparative international study of cues consumers use to recognize environmentally friendly packaging. *Int. J. Consum. Stud.* 44 (3), 258–271. <https://doi.org/10.1111/ijcs.12560>.
- Hutchinson, J.W., Alba, J.W., 1991. Ignoring irrelevant information: situational determinants of consumer learning. *J. Consum. Res.* 18 (3), 325–345. <https://doi.org/10.1086/209263>.
- Joshi, P., Kronrod, A., 2020. Sounds of green: how brand name sounds metaphorically convey environmental friendliness. *J. Advert.* 49 (1), 61–77. <https://doi.org/10.1080/00913367.2019.1696720>.
- Joshi, Y., Rahman, Z., 2015. Factors affecting green purchase behaviour and future research directions. *Int. Strateg. Manag. Rev.* 3 (1–2), 128–143. <https://doi.org/10.1016/j.ism.2015.04.001>.
- Jungbluth, N., Tietje, O., Scholz, R.W., 2000. Food purchases: impacts from the consumers' point of view investigated with a modular LCA. *Int. J. Life Cycle Assess.* 5 (3), 134–142. <https://doi.org/10.1007/BF02978609>.
- Judge, M., Fernando, J.W., Paladino, A., Mikolajczak, G., Kashima, Y., 2020. Lay concepts of art, craft, and manufacture and the implications for sustainable consumption. *J. Soc. Issues* 76 (1), 19–34. <https://doi.org/10.1111/josi.12368>.
- Ketelsen, M., Janssen, M., Hamm, U., 2020. Consumers' response to environmentally-friendly food packaging – a systematic review. *J. Clean. Prod.* 254. <https://doi.org/10.1016/j.jclepro.2020.120123>.
- Komatsu, L.K., 1992. Recent views of conceptual structure. *Psychol. Bull.* 112 (3), 500–526. <https://doi.org/10.1037/0033-2909.112.3.500>.
- Labrecque, L.L., Milne, G.R., 2013. To be or not to be different: exploration of norms and benefits of color differentiation in the marketplace. *Mark. Lett.* 24 (2), 165–176. <https://doi.org/10.1007/s11002-012-9210-5>.
- Lakoff, G., Johnson, M., 1980. Conceptual metaphor in everyday language. *J. Philos.* 77 (8), 453–486. <https://doi.org/10.2307/2025464>.
- La Macchia, S.T., Louis, W.R., Hornsey, M.J., Leonardelli, G.J., 2016. In small we trust: lay theories about small and large groups. *Personal. Soc. Psychol. Bull.* 42 (10), 1321–1334. <https://doi.org/10.1177/0146167216657360>.
- Lazzarini, G.A., Visschers, V.H.M., Siegrist, M., 2017. Our own country is best: factors influencing consumers' sustainability perceptions of plant-based foods. *Food Qual. Prefer.* 60, 165–177. <https://doi.org/10.1016/j.foodqual.2017.04.008>.
- Lee, A.Y., Labroo, A.A., 2004. The effect of conceptual and perceptual fluency on brand evaluation. *J. Mark. Res.* 41 (2), 151–165. <https://doi.org/10.1509/jmk.41.2.151.28665>.
- Lee, E.J., Bae, J., Kim, K.H., 2020. The effect of environmental cues on the purchase intention of sustainable products. *J. Bus. Res.* 120, 425–433. <https://doi.org/10.1016/j.jbusres.2019.10.048>.
- Levy, S.R., Chiu, C., Hong, Y., 2006. Lay theories and intergroup relations. *Group Process. Intergroup Relat.* 9 (1), 5–24. <https://doi.org/10.1177/1368430206059855>.
- Lieven, T., Grohmann, B., Herrmann, A., Landwehr, J.R., van Tilburg, M., 2015. The effect of brand design on brand gender perceptions and brand preference. *Eur. J. Mark.* 49 (1/2), 146–169. <https://doi.org/10.1108/EJM-08-2012-0456>.
- Lin, Y., Chang, C.A., 2012. Double standard: the role of environmental consciousness in green product usage. *J. Mark.* 76 (5), 125–134. <https://doi.org/10.1509/jm.11.0264>.
- Lindh, H., Olsson, A., Williams, H., 2016. Consumer perceptions of food packaging: contributing to or counteracting environmentally sustainable development? *Packag. Technol. Sci.* 29 (1), 3–23. <https://doi.org/10.1002/pts.2184>.
- Loken, B., 2006. Consumer psychology: categorization, inferences, affect, and persuasion. *Annu. Rev. Psychol.* 57, 453–485. <https://doi.org/10.1146/annurev.psych.57.102904.190136>.
- Loken, B., Barsalou, L.W., Joiner, C., 2008. Categorization theory and research in consumer psychology: category representation and category-based inference. In: Haugtvedt, C.P., Herr, P.M., Kardes, F.R. (Eds.), *Handbook of Consumer Psychology*. Taylor & Francis Group/Lawrence Erlbaum Associates, pp. 133–163.
- Luchs, M.G., Naylor, R.W., Irwin, J.R., Raghunathan, R., 2010. The sustainability liability: potential negative effects of ethicality on product preference. *J. Mark.* 74 (5), 18–31. <https://doi.org/10.1509/jmk.74.5.018>.
- Lunardo, R., Saintives, C., 2013. The effect of naturalness claims on perceptions of food product naturalness in the point of purchase. *J. Retail. Consum. Serv.* 20 (6), 529–537. <https://doi.org/10.1016/j.jretconser.2013.05.006>.
- Magnier, L., Crie, D., 2015. Communicating packaging eco-friendliness. *Int. J. Retail Distrib. Manag.* 43 (4/5), 350–366. <https://doi.org/10.1108/IJRD-04-2014-0048>.
- Magnier, L., Schoormans, J., 2017. How do packaging material, colour and environmental claim influence package, brand and product evaluations? *Packag. Technol. Sci.* 30 (11), 735–751. <https://doi.org/10.1002/pts.2318>.
- Marsh, B., 2002. Heuristics as social tools. *New Ideas Psychol.* 20 (1), 49–57. [https://doi.org/10.1016/S0732-118X\(01\)00012-5](https://doi.org/10.1016/S0732-118X(01)00012-5).
- Medin, 1989. Concepts and conceptual structure. *Am. Psychol.* 44 (12), 1469–1481. <https://doi.org/10.1037/0003-066X.44.12.1469>.
- Medin, Smith, E.E., 1984. Concepts and concept formation. *Annu. Rev. Psychol.* 35 (1), 113–138. <https://doi.org/10.1146/annurev.ps.35.020184.000553>.
- Meier, M.S., Stoessel, F., Jungbluth, N., Juraske, R., Schader, C., Stolze, M., 2015. Environmental impacts of organic and conventional agricultural products—are the differences captured by life cycle assessment? *J. Environ. Manag.* 149, 193–208. <https://doi.org/10.1016/j.jenvman.2014.10.006>.
- Meiting, L., Hua, W., 2021. Angular or rounded? The effect of the shape of green brand logos on consumer perception. *J. Clean. Prod.* 279. <https://doi.org/10.1016/j.jclepro.2020.123801>.
- Mick, D.G., 1986. Consumer research and semiotics: exploring the morphology of signs, symbols, and significance. *J. Consum. Res.* 13 (2), 196–213. <https://doi.org/10.1086/209060>.
- Newman, G.E., Gorlin, M., Dhar, R., 2014. When going green backfires: how firm intentions shape the evaluation of socially beneficial product enhancements. *J. Consum. Res.* 41 (3), 823–839. <https://doi.org/10.1086/677841>.
- Nguyen, A.T., Parker, L., Brennan, L., Lockrey, S., 2020. A consumer definition of eco-friendly packaging. *J. Clean. Prod.* 252, 119792. <https://doi.org/10.1016/j.jclepro.2019.119792>.
- Niedenthal, P.M., Halberstadt, J.B., Innes-Ker, A.H., 1999. Emotional response categorization. *Psychol. Rev.* 106 (2), 337–361. <https://doi.org/10.1037/0033-295X.106.2.337>.
- Nyilasy, G., Gangadharbatla, H., Paladino, A., 2014. Perceived greenwashing: the interactive effects of green advertising and corporate environmental performance on consumer reactions. *J. Bus. Ethics* 125 (4), 693–707. <https://doi.org/10.1007/s10551-013-1944-3>.
- Olson, J.C., 1978. Inferential belief formation in the cue utilization process. In: Hunt, Kent, Abor, Ann (Eds.), *NA – Advances in Consumer Research*. Vol. 05. Association for Consumer Research, MI, pp. 706–713.
- Olson, J.C., Jacoby, J., 1972. Cue utilization in the quality perception process. In: Venkatesan, M. (Ed.), *SV – Proceedings of the Third Annual Conference of the Association for Consumer Research*. Association for Consumer Research, pp. 167–179.
- Orth, U.R., Malkewitz, K., 2008. Holistic package design and consumer brand impressions. *J. Mark.* 72 (3), 64–81. <https://doi.org/10.1509/JMK.72.3.064>.
- Ostrom, E., 2006. The value-added of laboratory experiments for the study of institutions and common-pool resources. *J. Econ. Behav. Organ.* 61 (2), 149–163. <https://doi.org/10.1016/j.jebo.2005.02.008>.
- Pancer, E., McShane, L., Noseworthy, T.J., 2017. Isolated environmental cues and product efficacy penalties: the color green and eco-labels. *J. Bus. Ethics* 143 (1), 159–177. <https://doi.org/10.1007/s10551-015-2764-4>.
- Pickett-Baker, J., Ozaki, R., 2008. Pro-environmental products: marketing influence on consumer purchase decision. *J. Consum. Mark.* <https://doi.org/10.1108/07363760810890516>.
- Pollan, M., 2009. *The Omnivore's Dilemma: The Search for a Perfect Meal in a Fast-food World*. Bloomsbury Publishing.
- Poor, M., Duhachek, A., Krishnan, H.S., 2013. How images of other consumers influence subsequent taste perceptions. *J. Mark.* 77 (6), 124–139. <https://doi.org/10.1509/jm.12.0021>.
- Raghunathan, R., Naylor, R.W., Hoyer, W.D., 2006. The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *J. Mark.* 70 (4), 170–184. doi:www.acrwebsite.org/volumes/12961/volumes/v34/NA-34.
- Rajagopal, P., Burnkrant, R.E., 2009. Consumer evaluations of hybrid products. *J. Consum. Res.* 36 (2), 232–241. <https://doi.org/10.1086/596721>.
- Ratneshwar, S., Pechmann, C., Shocker, A.D., 1996. Goal-derived categories and the antecedents of across-category consideration. *J. Consum. Res.* 23 (3), 240–250.
- Richardson, P.S., Dick, A.S., Jain, A.K., 1994. Extrinsic and intrinsic cue effects on perceptions of store brand quality. *J. Mark.* 58 (4). <https://doi.org/10.2307/1251914>.
- Rokka, J., Uusitalo, L., 2008. Preference for green packaging in consumer product choices—do consumers care? *Int. J. Consum. Stud.* 32 (5), 516–525. <https://doi.org/10.1111/j.1470-6431.2008.00710.x>.
- Röös, E., Karlsson, H., 2013. Effect of eating seasonal on the carbon footprint of Swedish vegetable consumption. *J. Clean. Prod.* 59, 63–72. <https://doi.org/10.1016/j.jclepro.2013.06.035>.
- Samaraweera, M., Sims, J.D., Homsey, D.M., 2021. Will a green color and nature images make consumers pay more for a green product? *J. Consum. Mark.* 38 (3), 305–312. <https://doi.org/10.1108/JCM-04-2020-3771>.
- Scekic, A., Krishna, A., 2021. Do firm cues impact product perceptions? When small is natural. *J. Consum. Psychol.* 31 (2), 350–359. <https://doi.org/10.1002/jcpy.1210>.
- Schleenbecker, R., Hamm, U., 2013. Consumers' perception of organic product characteristics. *Appetite* 71, 420–429. <https://doi.org/10.1016/j.appet.2013.08.020>.
- Scott, Vigar-Ellis, D., 2014. Consumer understanding, perceptions and behaviours with regard to environmentally friendly packaging in a developing nation. *Int. J. Consum. Stud.* 38 (6), 642–649. <https://doi.org/10.1111/ijcs.12136>.
- Sengupta, J., Goodstein, R.C., Boninger, D.S., 1997. All cues are not created equal: obtaining attitude persistence under low-involvement conditions. *J. Consum. Res.* 23 (4), 351–361. <https://doi.org/10.1086/209488>.
- Seo, J.Y., Scammon, D.L., 2017. Do green packages lead to misperceptions? The influence of package colors on consumers' perceptions of brands with environmental claims. *Mark. Lett.* 28 (3), 357–369. <https://doi.org/10.1007/s11002-017-9420-y>.
- Silayoi, P., Speece, M., 2007. The importance of packaging attributes: a conjoint analysis approach. *Eur. J. Mark.* <https://doi.org/10.1108/IJRD-04-2014-0048>.

- Slepian, M.L., Galinsky, A.D., 2016. The voiced pronunciation of initial phonemes predicts the gender of names. *J. Pers. Soc. Psychol.* 110 (4), 509. <https://doi.org/10.1037/pspa0000041>.
- Slooman, S.A., Love, B.C., Ahn, W., 1998. Feature centrality and conceptual coherence. *Cogn. Sci.* 22 (2), 189–228. [https://doi.org/10.1016/S0364-0213\(99\)80039-1](https://doi.org/10.1016/S0364-0213(99)80039-1).
- Smithers, J., Lamarche, J., Joseph, A.E., 2008. Unpacking the terms of engagement with local food at the farmers' market: insights from Ontario. *J. Rural. Stud.* 24 (3), 337–350. <https://doi.org/10.1016/j.jrurstud.2007.12.009>.
- Snyder, H., 2019. Literature review as a research methodology: an overview and guidelines. *J. Bus. Res.* 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>.
- Steenis, N.D., van Herpen, E., van der Lans, Ivo A., Ligthart, T.N., van Trijp, H.C., 2017. Consumer response to packaging design: the role of packaging materials and graphics in sustainability perceptions and product evaluations. *J. Clean. Prod.* 162, 286–298. <https://doi.org/10.1016/j.jclepro.2017.06.036>.
- Steinhart, Y., Kamins, M., Mazursky, D., Noy, A., 2014. Effects of product type and contextual cues on eliciting naive theories of popularity and exclusivity. *J. Consum. Psychol.* 24 (4), 472–483. <https://doi.org/10.1016/j.jcps.2014.04.004>.
- Stoessel, F., Juraske, R., Pfister, S., Hellweg, S., 2012. Life cycle inventory and carbon and water footprint of fruits and vegetables: application to a swiss retailer. *Environ. Sci. Technol.* 46 (6), 3253–3262. <https://doi.org/10.1021/es2030577>.
- Thøgersen, J., 2011. Green shopping. <volume>Am. Behav. Sci.</volume> 55 (8), 1052–1076. <https://doi.org/10.1177/0002764211407903> (Beverly Hills).
- Thome-Ortiz, H., 2016. Turismo rural y sustentabilidad. El caso del turismo micológico en el Estado de México. In: Yaneth, Alicia (Ed.), En CARREÑOMELENDEZ, FERMÍN y VÁZQUEZ-GONZÁLEZ. Ambiente y patrimonio cultural. UAEM doi:www.aacademica.org/humberto.thome.ortiz/28.
- Torraco, R.J., 2005. Writing integrative literature reviews: guidelines and examples. *Hum. Resour. Dev. Rev.* 4 (3), 356–367. <https://doi.org/10.1177/1534484305278283>.
- Veryzer, R.W., 1999. A nonconscious processing explanation of consumer response to product design. *Psychol. Mark.* 16 (6), 497–522. [https://doi.org/10.1002/\(SICI\)1520-6793\(199909\)16:6<497::AID-MAR4>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1520-6793(199909)16:6<497::AID-MAR4>3.0.CO;2-Z).
- Wattenmaker, W.D., Nakamura, G.V., Medin, D.L., 1988. Relationships between similarity-based and explanation-based categorisation. In: Hilton, Denis J. (Ed.), *Contemporary Science And Natural Explanation: Commonsense Conceptions of Causality*. New York University Press.
- Whelan, T., Kronthal-Sacco, R., 2019. Actually, consumers do buy sustainable products. *Harv. Bus. Rev.* H050LW-PDF-ENG <https://hbr.org/2019/06/research-actually-consumers-do-buy-sustainable-products>.
- Wood, S., Robinson, S., Poor, M., 2018. The efficacy of green package cues for mainstream versus niche brands. *J. Advert. Res.* 58 (2), 165–176. <https://doi.org/10.2501/JAR-2018-025>.
- Yang, Z., Yang, H., Wang, H., 2020. Evaluating urban sustainability under different development pathways: a case study of the Beijing-Tianjin-Hebei region. *Sustain. Cities Soc.* 61, 102226. <https://doi.org/10.1016/j.scs.2020.102226>.