

# Isolated Environmental Cues and Product Efficacy Penalties: The Color Green and Eco-labels

Ethan Pancer<sup>1</sup> · Lindsay McShane<sup>2</sup> · Theodore J. Noseworthy<sup>3</sup>

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**Abstract** The current work examines how cues traditionally used to signal environmental friendliness, specifically the color green and eco-labels, and influence product efficacy perceptions and subsequent purchase intentions. Across three experiments, we find that environmental cues used in isolation (i.e., green color without an environmental label or an environmental label without green color) reduce perceptions of product efficacy. We argue that this efficacy discounting effect occurs because the isolated use of an environmental cue introduces category ambiguity by activating competing functionality and environmentally friendly schemas during evaluation. We discuss the implications of our findings for research on environmental consumption as well as offer insight into the effective use of environmental cues on product packaging.

**Keywords** Color green · Eco-labels · Environmental cues · Product packaging perceptions · Product efficacy · Categorization · Category ambiguity · Schema incongruity

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✉ Ethan Pancer  
ethan.pancer@smu.ca  
Lindsay McShane  
lindsay.mcshane@carleton.ca  
Theodore J. Noseworthy  
tnoseworthy@schulich.yorku.ca

<sup>1</sup> Sobey School of Business, Saint Mary's University, Sobey Building 147, 923 Robie Street, Halifax, NS B3H 3C3, Canada

<sup>2</sup> Sprott School of Business, Carleton University, 810 Dunton Tower, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada

<sup>3</sup> Schulich School of Business, York University, Seymour Schulich Building, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

In recent years, there has been a marked increase in the general public's awareness of and concern for environmental issues. This shift has led to distinct changes in the market, whereby consumers are stating an interest in purchasing environmentally friendly products and, correspondingly, expect companies to engage in programs that not only reduce their impact but also actually help the environment (Gershoff and Frels 2015; Luchs et al. 2010; Nielsen 2011). In fact, a Nielsen report finds that "83 percent of global online consumers say that it is important that companies implement programs to improve the environment" (2011, p. 7). Companies have responded to these demands in many ways, including introducing more environmentally oriented products and increasing their communications about the environmental orientation of both their products and organizational practices (Delmas and Cuerel Burbano 2011; Franklin 2008).

Consumers' responses to such products and communications, however, have been quite disparate. Extant literature notes (i) a pervasive gap between stated intentions to purchase environmentally oriented products and actual behaviors (Auger et al. 2003; Auger and Devinney 2007; Devinney et al. 2010), (ii) an erratic willingness-to-pay for environmental friendliness (Griskevicius et al. 2010; Nielsen 2011), and (iii) discrepant views of the quality of such products (Luchs et al. 2010, 2012; Newman et al. 2014). These inconsistencies highlight a need to more clearly understand the determinants of consumers' perceptions of and responses to environmentally oriented products. To date, much of the work in this area notes that consumers' responses to such products are based on their perceptions of the extent to which the product is environmentally friendly (e.g., Chang 2011; Ehrich and Irwin 2005; Irwin and Naylor 2009). Implicit in this work, however, is the assumption that consumers are first able to

clearly categorize a product as environmentally oriented or not and then, once categorized, proceed to evaluate the product relative to others within that domain. We argue that a critical determinant of consumers' responses to such products, however, is in fact the ability with which consumers are initially able to categorize the product as environmentally friendly or not. Specifically, drawing on the categorization inference literature, we argue that the physical representation of environmental cues on product packaging has critical implications for consumers' product responses because it influences whether consumers are able to clearly categorize the product as either environmental or functional.

Companies can use a variety of cues to signal environmental orientation on product packaging (e.g., color, imagery, eco-labels, and brand names). In certain instances, products display only a single cue (e.g., an eco-label), and yet in others, multiple cues are used (e.g., an eco-label and the color green). We argue that these variations have important implications for consumers' product responses. Specifically, we argue that a product displaying an isolated environmental cue will be perceived as lower in efficacy than products displaying multiple environmental cues *and* those with no environmental cues whatsoever. Consistent with prior work, we define product efficacy as inferences about functional performance and quality (Zeithaml 1988; Garvin 1984; Newman et al. 2014). The logic here, based on the categorical inference literature, is that an isolated environmental cue activates an environmentally related schema but then fails to further substantiate the environmental claim with other supporting cues. The resulting difficulty in categorizing the product as either environmental or functional then reduces product efficacy perceptions and subsequent purchase intentions. The removal of an isolated environmental cue or the addition of another cue, however, should mitigate the deleterious effects of category ambiguity by helping consumers to clearly categorize the product as either environmental or functional. We should note that these ambiguous environmental cues are unlikely to have a substantial impact on products that consumers already categorize as environmentally friendly (e.g., Toyota Prius). Indeed, a Toyota Prius would not require that it be green for consumers to accept that it is better for the environment. This paper focuses on the greater proportion of product categories, such as many consumer packaged goods (CPGs), where environmental schemas are activated through the use of certification or peripheral cues on the product's packaging (e.g., color), leaving the onus on the consumer to fit a product which is not traditionally linked to environmentalism into their broader environmental schema.

This paper adds to our understanding of consumers' complex, and oftentimes seemingly contradictory, responses

to environmentally oriented products. We first challenge the assumption that consumers are in fact always able to clearly categorize environmentally oriented products as such and then evaluate them within that category. In fact, we suggest that consumers will find certain products (i.e., those displaying an isolated environmental cue) difficult to categorize, and that this difficulty leads to deleterious effects on product efficacy perceptions and purchase intentions. This work then highlights that the physical representation of environmental cues on product packaging, in this case, the interplay between the color green and eco-labels, is an important determinant of consumers' responses to environmentally oriented products. One of our key goals here is to understand marketing implications of positioning products as environmentally friendly rather than examining the specific categorical nature of environmentally friendly products. As such, we do not explicitly focus our theoretical development on products that are inherently environmentally friendly but rather emphasize how these cues can impact generic product categories which seek to promote that their goods are environmentally friendly.

In the following section, we review the relevant literatures on consumers' perceptions of and responses to environmental products, the environmental cues of interest for the current work (i.e., the color green and eco-labels), and product categorization. Integrating this work, we then develop specific predictions about how isolated environmental cues negatively affect both product efficacy perceptions and purchase intentions by making it difficult to clearly categorize the product. We then present the results of three between-subjects experiments, discuss the implications and limitations of our work, and identify potential avenues for future research.

## Literature Review and Conceptual Development

### Consumer Perceptions of and Responses to Environmental Products

It is well established in the literature that there is great disparity between consumers' desire for organizations to produce environmentally responsible products and consumers' actual consumption of those products (e.g., Auger et al. 2003; Auger and Devinney 2007; Devinney et al. 2010). The issue that is less understood, however, is why such a gap exists. Recent work has begun to examine this issue, shedding light on the complexities underlying consumers' responses to environmental products. Devinney et al. (2010), for instance, find that consumers do believe that it is important to be ethical consumers, but are able to rationalize their non-ethical purchases by attributing their behavior to certain barriers (e.g., a lack of time and money)

or, in other cases, by asserting their dependency on the government to regulate business practices. Hopkins (2009) similarly highlights a lack of resources as a contributor to the gap and also identifies a lack of awareness and limited choices as additional barriers that affect environmental purchase behavior. Of particular interest for the current work, however, is the body of research that highlights a general consumer skepticism that a product can indeed excel in the categories of both functional quality and perceived environmental friendliness (e.g., Luchs et al. 2010, 2012; Newman et al. 2014). That is, it examines the phenomenon of environmental friendliness and product efficacy tradeoffs.

### *Environmental Friendliness and Product Efficacy Tradeoffs*

Perceived product efficacy is the consumer's judgment about overall product performance on the primary operating characteristics of a product (Zeithaml 1988; Garvin 1984). For example, in the case of soap, product efficacy is assessed based on cleaning performance (Newman et al. 2014). Of particular interest for the current work is recent evidence demonstrating that adding environmental cues to a product can influence perceptions of product efficacy. Newman et al. (2014), for instance, find that when a company intentionally tries to improve the environmental benefits of a product, consumers are more likely to think that resources may have been diverted from other attributes and so perceive the product as lower in functional quality. In a similar vein, Chernev and Carpenter (2001) argue that consumers understand that there are constraints in the product development process and so may infer that products that are superior on one attribute must be relatively inferior on other attributes. The notion of tradeoffs is also a feature of the sustainability liability, where under certain conditions, people believe that environmentally friendly products are less effective and therefore less desirable (Luchs et al. 2010). This gap stems from both consumers' perceptions of how environmental friendliness relates to other product attributes (Luchs et al. 2012) and from the associations that consumers hold about ethical products (Luchs et al. 2010). With regard to the former, Luchs et al. (2012) find that consumers tend to opt for a superior functional product over a superior environmental product and, more generally, demand that an environmental product meets a minimum standard for functionality. With regard to the latter, Luchs et al. (2010) argue that consumers fundamentally value functionality and environmental friendliness differently and make tradeoffs accordingly, whereby consumers typically associate ethicality with gentleness-related attributes. Thus, consumers tend to prefer environmentally friendly products when they

value such attributes but prefer non-ethical products when they value strength-related attributes. As Newman et al. (2014, p. 823) state, "many companies offer socially beneficial product enhancements that are orthogonal to the product's performance, such as benefits to the environment." Lin and Chang's work (2012) is consistent with these ideas in that they explicitly find that consumers tend to consider environmentally oriented products inferior to regular products. Specifically, in the context of products with cleaning efficacy as the primary operating characteristic (e.g., hand sanitizers and detergents), they find that consumers use environmentally oriented products in greater amounts than regular products in an effort to overcome their perceived lower effectiveness.

These findings suggest that consumers possess fundamentally different and potentially irreconcilable knowledge structures about functional products and environmental products. Further, it highlights that a consumer's decision to engage in sustainable consumption incorporates many considerations, including the various trade-offs involved in acquiring sustainable products (e.g., costs and convenience: Devinney et al. 2010; functionality: Luchs et al. 2012; product strength: Luchs et al. 2010). Finally, it also implies that consumers, in order to make such tradeoffs, must make certain inferences about the product along several dimensions. This final point raises the critical question of how such inferences are formed. Chang's (2011) work finds that a critical determinant is the way in which environmental claims are portrayed and, more generally, suggests that the way consumers perceive environmental cues is important in shaping product evaluations.

Remarkably, there is relatively scant research that has directly considered consumers' *perceptions* of products with environmental cues. Yet, this critical review of the literature clearly highlights its potential importance in understanding consumers' environmental consumption patterns. The current work takes steps to address this issue by examining how environmental cues on product packaging, and in particular the interaction of such cues, influence consumers' product perceptions. To do so, we first engage in a brief review of the literature on two dominant environmental cues (the color green and eco-labels) and then turn to examine how such cues, depending on how they are used, can significantly influence product efficacy perceptions and purchase intentions through their effect on product category ambiguity

### **Environmental Cues: The Color Green and Eco-labels**

There are many ways that organizations can signal the environmental orientation of their products. Firms often develop specific environmental attributes that offer

enhanced utility to consumers (i.e., energy efficiency of electrical products; health benefits of organic produce). They also can signal their environmental friendliness through supply chain management cues (e.g., greenhouse gas emissions), third-party certification cues (e.g., EnergyStar) and marketing-based cues that symbolically convey environmentally friendly product positioning (e.g., green imagery, eco-labels). We specifically focus on the latter examples, where the explicit utility of the cue is not readily accessible to the consumer, and the onus is on consumers to situate the product within their broader environmental schema. These cues play an important role in signaling environmental orientation given that consumers typically cannot verify specific environmental attributes in products (Atkinson and Rosenthal 2014). Some cues, however, are more prevalent than others. A recent report by Terrachoice (2010) highlights environmental imagery (including the use of the color green) and eco-labels as particularly dominant environmental cues and ones that are most commonly linked to the marketing ‘sin’ of greenwashing. Given the prevalence of such cues, and their tendency to be misused by companies to signal environmental orientation, we focus on these two cues in the current work. Specifically, we focus on how the color green and eco-labels, and the interplay between the two, influence product efficacy perceptions and subsequent purchase intentions.

### *The Color Green*

The terms ‘green’ and ‘environmentally friendly’ are often used interchangeably. It is not uncommon to read and hear phrases such as “going green,” “being green,” “green products,” and “green consumers,” among others, to refer to the process of purchasing environmentally friendly products. The association between the color green and the environment is captured in the extant literature as well. The color green has long been associated with concepts related to nature (see Lichtenfeld et al. 2012 for a review). Recent empirical research suggests that the color green is indeed associated with nature (Naz and Epps 2004), a connection with the outdoors (Clarke and Costall 2008), and even ruggedness when blended with brown colors (Labrecque et al. 2013). In Elliot and Maier (2014), an article on perceiving color in the *Annual Review of Psychology*, the color green is highlighted as having positive links to the natural realm, including green foliage and vegetation. As Labrecque et al. (2013, p. 193) state, “the color green has been adopted as a marketing tool for environmentally conscious consumption.” Consistent with this body of work, we posit that the color green has become embedded in the schema of environmental responsibility, meaning that it can trigger environment-related thoughts.

### *Eco-labels*

We now turn to the literature on eco-labels, arguing that they are similarly embedded in the schema of environmental responsibility. Eco-labels are of a wide range of certification labels that are used to signal various ethical qualities about products (e.g., ethical sourcing, fairtrade, energy efficiency, labor practices, animal rights, environmental orientation, etc.). They focus specifically on signaling the environmental orientation of the product and/or organization and are increasingly being used to lend credibility to environmental claims (Stefan and Paul 2008; Terrachoice 2010).

According to the International Organization for Standardization (2012), eco-labels can be divided into two categories: an independent mark or logo awarded based on the fulfillment of a set of environmentally friendly product criteria (i.e., Ecologo—Type I environmental labeling), or self-declared environmental claims a manufacturer can make (i.e., P&G’s Future Friendly logo). In addition to this overarching distinction, individual eco-labels have also been found to vary on a number of factors, including the level of information that they provide, the specificity of their arguments, the source of the label, and the ease of comprehension (Atkinson and Rosenthal 2014; D’Souza et al. 2006; Teisl et al. 2008). Such variations have been found to lead to differential consumer responses in terms eco-label trust, perceived claim credibility, willingness to pay, and product attitudes (Atkinson and Rosenthal 2014; Peattie 2010; Stefan and Paul 2008; Teisl et al. 2008). It is important to note here that this stream of research consistently finds that eco-labels are typically well received by consumers (Atkinson and Rosenthal 2014) and that they significantly impact perceptions of environmental friendliness (Teisl et al. 2008). In fact, Atkinson and Rosenthal (2014) find that eco-labels generate positive perceptions of environmental friendliness particularly for low-involvement products. Taken together, this work suggests that eco-labels, like the color green, are embedded in an environmentally friendly schema.

Of particular relevance for the current work is to note that existing research on environmental cues, including both the extant literature on the color green and that on eco-labels, typically examine the effects of one particular cue. Specifically, they focus on how variations of a given environmental cue (e.g., the degree of argument specificity on the eco-label) influence consumers’ product responses. This approach not only highlights tactics for developing effective environmental cues, but it also obscures potentially important outcomes associated with the use of multiple environmental cues. In fact, a review of the category inference literature suggests that whether an environmental cue is used in isolation or rather paired with another cue

may significantly influence consumers' product evaluations. We now turn to review this literature.

### Category Inferences and Product Perceptions

A category is a mental collection of objects that appear to be related in some way (Rosch 1978). The research on categories in consumer psychology is vast, examining how people group objects based on products, brand, goals, and attributes (see Loken et al. 2008 for a review). Categories are involved in inference-making processes for evaluating characteristics of products. For example, when a new product is classified as a member of an existing category, information from that category is transferred to the novel item and used to structure the new representation (Gregan-Paxton et al. 2005; Noseworthy and Goode 2011; Noseworthy et al. 2012). The way in which a product is categorized is an important determinant of product evaluation in that it alters how consumers frame certain product characteristics (Gershoff and Frels 2015).

A central premise of the categorical inference literature is that people have a strong preference towards categorizing objects within a single category such that they can use their category-based knowledge to make inferences about the focal object (Gregan-Paxton et al. 2005; Noseworthy and Goode 2011; Macrae et al. 1995). This tendency, referred to as the single category inference process, has emerged as the default strategy for generating an inference for products (Macrae et al. 1995). Existing research has suggested that "individuals are able to use information from multiple categories to draw inferences about ambiguous stimuli, but that they are typically unwilling to do so unless significant contextual support is provided" (Gregan-Paxton et al. 2005, p. 129). Instead, consumers overwhelmingly employ a single category inference strategy in the absence of detailed information on relationship between categories (Moreau et al. 2001). Even under situations where consumers are presented with an object that is difficult to classify, they have a desire to make inferences from a single category (Murphy and Ross 1994, 1999; Noseworthy and Goode 2011; Noseworthy et al. 2012; Ross and Murphy 1996).

This preference for single-category categorization raises the question how consumers respond to products that do not clearly fit within a single category. Gregan-Paxton et al. (2005, p. 127) refer to this challenge as categorization ambiguity, which "exists when information about a new product makes it difficult or impossible to place the novel offering in a single, existing category." Even in such cases consumers will strive to categorize the product within a single category. To do so, they have been found to engage in strategies such as schema switching, wherein they abandon the initially cued category in favor of a more suitable alternative (Noseworthy and Trudel 2011;

Stayman et al. 1992). Of particular interest for the current work, however, is research demonstrating that products that do activate multiple categories due to incongruous product attributes have deleterious effects on consumer product evaluations because they force consumers to make difficult tradeoffs in order to classify the product in a single category. Specifically, extreme incongruity between attributes has been found to negatively affect the way in which the consumer evaluates the product on a number of different dimensions, particularly due to the tension cause by products that people cannot fit into an activated schema (*schema congruity theory* Mandler 1982; Meyers-Levy and Tybout 1989; Noseworthy et al. 2014).

This extant literature is particularly relevant for the current research. First, it highlights that consumers prefer to draw inferences about a product based on a single category, even when facing a product that is difficult to classify. Second, it finds that, when evaluating a product that is difficult to categorize, consumers will be forced to make difficult tradeoffs to achieve single category inference that ultimately elicit more negative product evaluations. These points are particularly important when placed in conversation with the literature on functional/environmental tradeoffs, which suggests that consumers hold different knowledge structures about what it means to be a part of a functional or an environmental category. Specifically, an integrative analysis suggests that consumers may experience more negative responses to products that activate both environmental and functional schemas. We now turn to examine these ideas in more depth and to develop specific hypotheses regarding consumers' product perceptions vis-a-vis the selected environmental cues.

Drawing on our review of the literature, we argue that environmental cues on product packaging (e.g., the color green or an environmental certification label) will activate an environmental schema. Once activated, consumers will aim to categorize the product as either functional or environmentally friendly. To categorize as environmentally friendly, we argue that consumers will likely seek out additional environment-related cues to support single-categorization as an environmentally friendly product. This expectation is based on a stream of research noting consumers' skepticism towards environmental claims, making them more likely to seek additional validation that the product can indeed be accurately categorized as environmental (e.g., Laufer 2003; Chang 2011; Skarmeas and Leonidou 2013). In the case where this search reveals a lack of additional environmental cues to support categorization, we expect the simple categorization process to be inhibited, leading to a negative effect on consumers' perceptions of product efficacy due to category ambiguity. Specifically, we predict that products with an isolated environmental cue (i.e., the use of the color green alone or



eco-label alone) will be subject to perceptions of lower product efficacy. The availability of supporting cues, however, should mitigate such effects by facilitating categorization as an environmentally friendly product. The absence of any environmental cues on a product should similarly avoid efficacy discounting effects—such products preclude the activation of an environmentally friendly schema and so also facilitate single-inference categorization, but in this case, categorization is based on functionality. As such, we predict as follows:

**H<sub>1A</sub>** The isolated use of the color green as an environmental cue will reduce product efficacy perceptions relative to identical products with no such cue.

**H<sub>1B</sub>** The isolated use of an eco-label as an environmental cue will reduce product efficacy perceptions relative to identical products with no such cue.

**H<sub>1C</sub>** The efficacy discounting effects predicted in H<sub>1A</sub> and H<sub>1B</sub> will be mitigated when the isolated environmental cue is supported by additional environment-related product attributes.

It is important to note that perceptions of product quality and efficacy have long been theorized to be an intervening construct to understand purchase intentions (see Zeithaml 1988). Chang and Wildt (1994) empirically demonstrated that perceptions of efficacy have a direct effect on purchase intentions. In terms of the downstream consequences in the current context, we predict that perceived product efficacy will mediate the relationship between the isolated environmental cue and purchase intentions. That is, we predict that the effects of isolated environmental cues go beyond influencing perceptions of product efficacy to also have a meaningful indirect influence on purchase intentions.

**H<sub>2</sub>** The isolated use of an environmental cue (i.e., the color green) will have an indirect effect on purchase intentions through the mediator of perceived product efficacy.

Notably, we believe it is unlikely that the impact of an isolated environmental cue will influence purchase intentions only through product efficacy (i.e., as indirect-only mediation: Zhao et al. 2010). We rather anticipate that these environmental cues likely influence a myriad of other variables beyond the scope of the current investigation (e.g., esthetics, attractiveness, and mood), and these certain of these variables are also likely to influence purchase intentions.

## Experiments

We conducted three experiments to test our predictions. Study 1 examined our basic hypotheses that products portraying either the color green or an eco-label as an

isolated environmental cue would be perceived as lower in efficacy than products with no environmental cues (H<sub>1A</sub>, H<sub>1B</sub>). Furthermore, Study 1 tested whether substantiating the environmentally friendly schema by adding supporting cues would mitigate this effect (H<sub>1C</sub>). Finally, Study 1 examined the predicted downstream effects using combined or isolated environmental cues on purchase intentions via perceptions of product efficacy (H<sub>2</sub>). Study 2 consisted of two parts—a test to empirically demonstrate that the color green, even when not explicitly used as an environmental cue, heightens perceptions of environmental friendliness (Study 2A) and a conceptual replication of Study 1 that served to offer further support for the proposed category ambiguity mechanism (Study 2B). With regard to the latter, we activated the environmental schema prior to product exposure rather than relying on product cues for category activation as in Study 1. This enabled us to demonstrate the efficacy discounting effects even in the absence of supplementary environmental attributes. Study 2 also tested a stimulus in a different product category with different packaging and different non-green colors. Study 3 addresses concerns that these effects may be driven by alternate mechanisms, specifically that our particular non-green colors could bolster efficacy or that our results are an artifact of certification labels instead of environmental labels.

## Study 1

Study 1 tested whether the use of the color green or the use of a certified eco-label as isolated cues on product packaging could taint inferences about the efficacy of the product relative to identical products with no environmental cues (i.e., non-green-colored products with no certified eco-label; re: H<sub>1A</sub>, H<sub>1B</sub>). We also tested the prediction that supplying an additional environment-related cue (i.e., adding a certified eco-label to a green-colored product) would mitigate the efficacy discounting effect caused by a single cue (H<sub>1C</sub>).

### *Experimental Design and Procedures*

One hundred and twenty-one undergraduate business students (45 % male) participated in a 2 (Product Color: Green vs. Blue) × 2 (Eco-label: Present vs. Absent) between-subjects factorial design in exchange for course credit at a mid-sized Canadian university. Participants were informed that the study was a brief product evaluation study and then shown a standard container of Tide laundry detergent (see Appendix 1). We chose to focus on the cleaning product category for three primary reasons. First, the cleaning product category has been noted to use environmental cues more prevalently than other product

categories (Terrachoice 2010). Second, product efficacy perceptions in this category are generally measured along one central domain (e.g., the ability to clean clothes; Newman et al. 2014). Third, cleaning products are not consumed in the public domain, thus mitigating impression management concerns associated with green products (Griskevicius et al. 2010).

The Tide containers were identical across conditions except for two subtle changes: First, we varied the color of the packaging; both the cap and the small triangle label were either green or blue. Second, we varied the presence or absence of an eco-label, which was found on the bottom right side of the bottle (refer to Appendix 1). Importantly, the color of the packaging was not manipulated in image-editing software, but instead, we used real offerings from the Tide brand product line. For the eco-label, we used the certified logo of the Ecologo Program. Ecologo is an ISO 14024 Type I environmental standards certification program with benchmarks for green practices fully disclosed on their website. Following product exposure, participants were asked their likelihood to purchase the product and their perceptions of product efficacy. Perceptions of product efficacy were measured using three items ( $\alpha = .80$ ), which included the extent to which they believed the detergent was a quality product, effective, or of poor quality [reverse-scored] (adapted from Newman et al. 2014). Purchase intent was captured with two items, which included likelihood that they would either purchase this product or consider purchasing this product ( $r = .84$ ,  $p < .001$ ).

## Results

An ANOVA revealed a significant interaction between Product Color and Eco-label on participants' perceptions of product efficacy ( $F(1, 117) = 6.56$ ,  $p < .05$ ). As expected, follow-up analysis revealed that, *within* the no eco-label condition, efficacy perceptions were lower for the Green product ( $M = 5.67$ ) than for the identical non-green product (i.e., Blue;  $M = 6.16$ ,  $F(1, 63) = 7.64$ ,  $p < .01$ ), supporting  $H_{1A}$ . However, when we introduced an eco-label, there was no significant difference between the perceived efficacy of the green and the blue products ( $M_{\text{Green}} = 5.93$  vs.  $M_{\text{Blue}} = 5.74$ ,  $F < 1$ ), supporting  $H_{1C}$ . Planned contrasts also revealed the expected difference in perceived efficacy perceptions *within* the Blue color condition. Specifically, the eco-label decreased perceptions of product efficacy ( $M = 5.74$ ) compared to when there was no eco-label ( $M = 6.16$ ;  $F(1, 63) = 6.01$ ,  $p < .05$ ), supporting  $H_{1B}$ . Critically, there was no significant difference in efficacy inferences across the presence or absence of an eco-label when the product had a green cue ( $M_{\text{Eco}} = 5.93$  vs.  $M_{\text{No-Eco}} = 5.67$ ;  $F(1, 54) = 1.59$ ,

$p = .21$ ). No other main effects approached significance ( $ps > .26$ ).

An ANOVA on purchase intentions also revealed a significant Product Color  $\times$  Eco-label interaction ( $F(1, 117) = 10.06$ ,  $p < .01$ ). Consistent with the product efficacy results, follow-up analysis revealed that *within* the no eco-label condition, participants were significantly less likely to purchase the green product ( $M = 5.35$ ) relative to the blue product ( $M = 6.24$ ;  $F(1, 63) = 18.15$ ,  $p < .01$ ). However, when an eco-label was added to the green product, this difference was no longer significant ( $M_{\text{Eco}} = 5.89$  vs.  $M_{\text{No-Eco}} = 5.76$ ,  $F < 1$ ). Planned contrasts also demonstrated a significant difference in purchase intentions *within* the Blue condition. Specifically, the results showed that the presence of an eco-label decreased purchase intentions ( $M = 5.76$ ) relative to the no eco-label condition ( $M = 6.24$ ;  $F(1, 63) = 5.55$ ,  $p < .05$ ). There was a significant main effect of color on purchase intentions, where the blue product was preferred ( $M = 6.00$ ) over the green product ( $M = 5.62$ ;  $F(1, 117) = 5.58$ ,  $p < .05$ ). No other effects approached significance ( $ps > .83$ ) (Table 1).

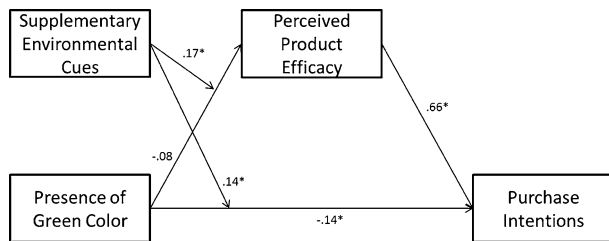
We were also interested in examining the conditional indirect effects of Product Color on purchase intentions through perceptions of product efficacy, moderated by Eco-label. To test this, we used PROCESS Model 8, a versatile computational tool for observed variable mediation (Hayes 2008). This particular model is referred to as *moderated mediation*, because the indirect effect or mechanism pathway through which  $X$  (Product Color) exerts its effect on  $Y$  (Purchase Intentions) via the mediator (Perceived Efficacy) is dependent on the value of a moderator (Eco-label) (see Fig. 1). Ninety-five percent bias-corrected and accelerated confidence intervals were calculated for the indirect effect, based on 5000 bootstrap resamples. Consistent with bootstrapping techniques detailed in Zhao et al. (2010), we first examined the indirect path. When the eco-label was absent, there was a significant indirect effect of Product Color on purchase intentions through perceived efficacy ( $\beta = -.16$ ;  $CI_{95\%} -.33$  to  $-.05$ ). This means that a product with green packaging and no eco-logo (i.e., an ambiguous environmental cue) leads to significantly lower purchase intentions than an identical non-green product, and this drop occurs following a decrease in perceived efficacy. This indirect effect is mitigated when an eco-label is added, as the confidence intervals span zero ( $\beta = .06$ ;  $CI_{95\%} -.07$  to  $.20$ ).

## Discussion

Study 1 provides preliminary evidence that using the color green or an eco-label in isolation on product packaging can negatively influence perceptions of product efficacy ( $H_{1A}$ ,  $H_{1B}$ ). It also supports the prediction that supplying an

**Table 1** Study 1 means and standard deviations

Cell mean (standard deviation)	Perceived efficacy	Purchase intentions
Green color, no label	5.67 (0.80)	5.35 (0.92)
Green color, ecolabel	5.93 (0.73)	5.89 (0.99)
Non-green color, no label	6.16 (0.62)	6.24 (0.77)
Non-green color, ecolabel	5.74 (0.76)	5.76 (0.86)

**Fig. 1** Study 1: PROCESS Model 8—Moderated Mediation Analysis

additional environmental cue mitigates the efficacy discounting effect ( $H_{1C}$ ). Specifically, we find that the green-colored product in this study was perceived as lower in efficacy than an identical non-green product, but that adding a substantiating environmental cue in the form of an eco-label mitigated this effect. Conversely, and rather noteworthy, we found that the eco-label product in this study was perceived as lower in efficacy than an identical non-eco-label product, but adding a substantiating green cue mitigated this effect. Taken together, the results are consistent with the category ambiguity argument: isolated environmental cues activate an environmental schema, but a lack of supporting cues leads to uncertainty, which manifests as concerns about the product's efficacy.

We also find evidence of a conditional indirect effect of product color on purchase intentions via perceived product efficacy. This result is consistent with the expectation that a product with green-colored packaging and no eco-label (i.e., an ambiguous environmental cue) leads to significantly lower purchase intentions than an identical non-green product. This indirect effect is mitigated, however, when an eco-label is added ( $H_2$ ).

Although this study provides preliminary evidence that an ambiguous environmental cue (i.e., the color green) can reduce perceptions of efficacy relative to products with multiple cues (i.e., the color green and an eco-label) or no such cues (i.e., blue with no eco-label), it does not empirically validate that the selected environmental cues heighten perceptions of environmental friendliness. This link is central to our argument that these cues

independently activate an environmental schema that cannot be resolved when the respective cues are used in isolation.

As noted earlier, extant literature certainly provides robust support for both of the links demonstrated in Study 1 (i.e., green to environmental and eco-labels to environmental), but we feel that additional empirical evidence is needed to further isolate the use of the color green. Specifically, while eco-labels are always used to signal environmental orientation and thus have a clear link to environmental schemas, the color green is at times used for other purposes (e.g., to indicate a scent or flavor such as mint, apple, etc.). A key step then is empirically demonstrating that the color green is in fact normatively perceived by consumers as an environmental cue. Accordingly, the next study takes steps to both empirically demonstrate the link between the color green and perceived environmental friendliness and to conceptually replicate the core findings from this study regarding isolated environmental cues and product perceptions.

## Study 2

The primary purpose of Study 2 was to conceptually replicate the findings from our first experiment in order to demonstrate the robustness of the effects and to better flesh out the proposed underlying mechanism of categorization ambiguity. A necessary step, however, was to address the key limitation of our first experiment. Specifically, in an effort to be conservative, we have chosen products where the color green has a long history in packaging efforts within the category. We strategically did this to isolate how the environmental schema activates at the intuitive level. This does raise the question, however, whether seeing soap or a detergent with green on its packaging leads people to make the connection of being environmentally friendly. After all, many of these products regularly use the color green without meaning they have a less impact on the environment. However, because schemas can activate intuitively from normatively generated associations (i.e., color), we believe this effect may hold even in categories



traditionally linked to green. As such, in this study, we begin by empirically establishing the link between the color green and an environmental schema (Study 2A) and then proceed to the conceptual replication of Study 1 (Study 2B).

### *Study 2A (Color and Environmental Friendliness)*

To empirically examine the link between the color green and environmental schemas, we invited one hundred and forty two undergraduate business students (54 % male) from a mid-sized Canadian university to participate in a 2 (Color: Orange vs. Green)  $\times$  2 (Justification for Color: None vs. Scent) experiment in exchange for course credit. Participants were shown a bottle of Dawn dish soap that was either green or orange in color. The images consisted of an actual Dawn product with the exception that the text indicating the scent of each product was obscured. Rather, in half of the conditions, a line of text was placed above the bottle of dish soap noting the scent of the soap (i.e., apple-scented for green products, orange-scented for orange products) (Scent as Justification). These scents were taken from actual Dawn dish soap products with the respective colors. In the other half of cases, participants received no information about the product (No Justification). When participants were not provided with a reason to justify the color, we expected participants to naturally attribute the green color to the environmental orientation of the product (i.e., perceive green as an environmental cue) and so deem the green soap more environmentally friendly than the orange soap. In contrast, providing a reason to explain the color of the product (i.e., scent) should mitigate this effect by activating an alternate schema. The logic here is that, in such cases, participants will attribute the green color to the scent rather than environmental friendliness. Following exposure to the product, participants were simply asked to indicate the extent to which they perceived the product as environmentally friendly ( $\alpha = .82$ ), which was adapted from Haws et al. (2014) on green consumption values. Participants indicated on a 4-item scale, from 1 to 100, the extent to which they viewed the product as environmentally friendly, committed to making the environment better, more environmentally friendly than similar products, and as less harmful to the environment than other similar products.

### *Results and Discussion*

An ANOVA revealed the expected Color  $\times$  Justification interaction on participants' perceptions of environmental friendliness ( $F(1, 139) = 6.95, p < .05$ ). As expected, follow-up analysis showed that the green-colored soap was perceived as significantly more environmentally friendly

( $M = 55.71$ ) than the orange-colored soap in the No Justification condition ( $M = 45.69; F(1, 68) = 6.90, p < .05$ ). This effect did not manifest, however, when scent information was provided to explain product color ( $M_{\text{Green}} = 47.35$  vs.  $M_{\text{Orange}} = 51.76, p = .26$ ). As expected, a follow-up contrast within the green condition confirmed that the green-colored product was perceived as more environmentally friendly when no association was provided ( $M = 55.71$ ) than when a scent association was provided ( $M = 47.35; F(1, 69) = 4.27, p < .05$ ). No other contrasts approached significance ( $ps > .11$ ).

As predicted, the results of this test provide empirical support for the argument that the color green can serve independently as an environmental cue, even if it is not explicitly intended to do so. This establishes a clear empirical link between the color green and perceptions of environmental friendliness, and so going forward, we turn our focus back to the relationship between the environmental cues of the color green and eco-labels, and both product efficacy perceptions and subsequent purchase intentions.

### *Study 2B (Conceptual Replication of Study 1)*

The specific aim of Study 2B was to isolate product category activation, and the related role of category ambiguity in driving the efficacy discounting effects noted in Study 1. To do so, we more explicitly activated the environmental category by asking half of the participants to read a vignette about environmental products prior to product exposure (activating environmental schema) and the other half to read a neutral vignette. Priming category-based concepts has been demonstrated to increase accessibility of schema-relevant information during evaluation (Herr 1989). Cueing the category stands in contrast to Study 1 where we relied on existing environmental cues (e.g., the color green, certified eco-label) to activate an environmental schema. In this study, we also felt it was important to demonstrate that the predicted effects hold in a different product category (dish soap vs. laundry detergent) and using a different packaging-based manipulation of color. With regard to the latter, product color was manipulated through inherent properties of the product, which was visible through the transparent bottle of Dawn dish soap rather than through product packaging (the color of the Tide cap and bottle sticker). The non-green color was also changed from blue to orange.

Consistent with Study 1, we predicted that participants in the green-colored product condition would perceive the Dawn soap as lower in efficacy than those in the non-green-colored product condition and therefore have lower purchase intentions. We did, however, expect this discounting effect to be mitigated when participants were

primed to access the environmental schema. Specifically, reading a vignette that activates an environmental schema should lead consumers to search for supporting information upon exposure to a product. Green colors (or other environmental cues) support the already-activated environmental schema, whereas the absence of such cues (i.e., non-green-colored product with no other environmental cues) is expected to result in category ambiguity and thus decrease product efficacy perceptions.

### Experimental Design and Procedure

Ninety-eight undergraduate business students (46 % male) participated in a 2 (Product Color: Green vs. Orange)  $\times$  2 (Prime: Environmental vs. Neutral) between-subjects factorial design in return for course credit at a mid-sized Canadian university. Participants were told that they were going to complete two studies: a memory judgment task and a product evaluation task. In fact, the first study was the prime, whereby participants were asked to read an excerpt from a recent press release about either the increasing availability of environmentally friendly products (environmental category prime) or an upcoming performance at the local theater (neutral category prime). The selected font, font size, length, information content, and general layout of the message were identical across the two conditions. After reading the press release excerpt, participants were asked to complete an ostensibly unrelated product evaluation study. Each participant was then shown a bottle of Dawn dish soap (see Appendix 2). The bottles of dish soap were identical in every aspect except for the soap's color, which was either green or orange. Notably, product color was not manipulated in image-editing software; the colors presented were real offerings from the brand. Following product exposure, participants completed the same measures from Study 1 on perceptions of product efficacy ( $\alpha = .80$ ) and their likelihood to purchase the product ( $r = .78, p < .001$ ).

### Results

An ANOVA revealed the expected Product Color  $\times$  Prime interaction on participants' perceptions of efficacy ( $F(1, 94) = 4.83, p < .05$ ). Consistent with  $H_{1A}$ , follow-up analyses showed that participants presented with the Neutral Prime perceived the Green soap as having significantly lower efficacy ( $M = 5.27$ ) than the identical Orange soap ( $M = 5.73; F(1, 45) = 4.21, p < .05$ ). When participants were exposed to an Environmental Category Prime, however, the difference was no longer significant ( $M_{\text{Enviro-Prime}} = 5.38$  vs.  $M_{\text{Neutral-Prime}} = 5.04; F(1, 49) = 1.44, p = .23$ ), supporting  $H_{1C}$ . Consistent with our prior results, we find that within the Orange condition, perceptions of

product efficacy were lower following the environmental prime ( $M = 5.04$ ) than following the neutral prime ( $M = 5.73; F(1, 42) = 5.56, p < .05$ ). No other contrasts approached significance ( $ps > .64$ ) (Table 2).

To test moderated mediation we once again employed Model 8 in the PROCESS macro for SPSS (Hayes 2008). When presented with the Neutral Prime, there was a significant indirect effect of product color on purchase intentions through perceived product efficacy ( $\beta = -.19; CI_{95\%} -.39$  to  $-.03$ ). However, when presented with the Environmental Category prime, the confidence intervals spanned zero, indicating a non-significant indirect effect ( $\beta = .14; CI_{95\%} -.07$  to  $.42$ ). The mediation analysis is consistent with the notion that green color in isolation lowers perceived product efficacy, which in turn, decreases purchase intentions. This path did not hold for conditions where consumers were presented with the environmental category prime, whereby the green color served as an additional cue (Fig. 2).

### Discussion

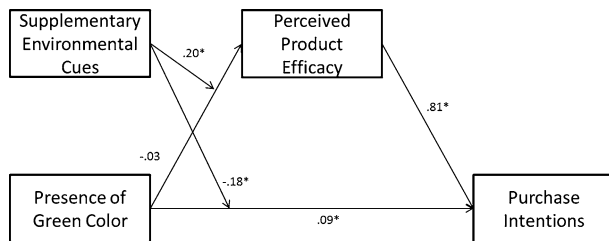
The results of Study 2B helped to more clearly demonstrate the proposed underlying role of category ambiguity by manipulating the salience of the environmental schema prior to viewing the product. Consistent with Study 1, under neutral prime conditions, green-colored products were perceived as lower in efficacy than non-green products and were less likely to be purchased. This discounting effect, however, was mitigated when participants were primed for environmental categorization. This is consistent with the idea that the environmental prime activated an environmentally friendly schema, which led consumers to search for additional environmental product cues to assist with categorization efforts. In a similar vein, non-green-colored products were evaluated as lower in efficacy when participants were primed with environmental category information due to a lack of supporting product cues. The results for Study 2B also support the process of perceived efficacy mediating the detrimental impact of isolated environmental cues on purchase intentions. This indirect effect is mitigated when individuals can establish a coherent environmental schema (i.e., then environmental category information is made salient).

### Study 3

Studies 1 and 2 provide evidence that products with isolated environmental cues are perceived as lower in product efficacy than identical products that either have no such cues or with coordinated environmental cues. These studies demonstrate an environmental discounting effect that holds across different product categories (i.e., dishwashing soap

**Table 2** Study 2 means and standard deviations

Cell mean (standard deviation)	Perceived efficacy	Purchase intentions
Green color, neutral prime	5.27 (0.79)	5.23 (0.79)
Green color, environmental prime	5.38 (0.87)	5.25 (0.95)
Non-green color, neutral prime	5.73 (0.73)	5.07 (1.18)
Non-green color, environmental prime	5.04 (1.13)	5.15 (1.34)

**Fig. 2** Study 2: PROCESS Model 8—Moderated Mediation Analysis

and laundry detergent), different operationalizations of environmental cues (i.e., primes, inherent green-colored products, green-colored packaging, and certified eco-labels), and different comparison colors (i.e., blue and orange). However, it is important to note that in both Study 1 and Study 2B, there was no control for color. This raises the possibility that it may not be that the color green independently drops efficacy ratings, in as much as another color may be raising efficacy perceptions. For instance, the color blue is often linked to cleanliness and freshness—research has found blue associated with the sky, water, openness, and peace (e.g., Kaya and Epps 2004; Mehta and Zhu 2009; Elliot and Maier 2007). Similarly, the color orange is used in several cleaning products to build the association with citrus and has been linked to associations of warmth (e.g., Elliot and Maier 2007). Thus, without a color control, there is no way to truly isolate whether the green color is reducing perceived efficacy or whether other colors are more dominantly associated with performance and thus are enhancing perceived efficacy.

A second concern, related to the above notion of experimental control, comes by way of the product category selected and the link to the label. Given that, as discussed in the lead-into Study 2A, we strategically chose categories with a history of green cues as a means of demonstrating the robustness of our effect in a more conservative setting, there is the question whether adding a logo to something already linked to green, merely leads people to infer that the product has undergone a rigorous examination to meet legal requirements, and thus enhancing perceived efficacy. This would suggest that there is

nothing particularly unique about the eco-label and its association to environmentalism. Although this would not explain why the eco-label independently drops perceived efficacy, it is important to isolate that we are indeed tapping the environmental schema. If not, then we should be able to get identical results using an alternate designation or label (e.g., Fairtrade). Thus, in essence, the purpose of the study 3 was to mitigate rival hypotheses concerning the colors and labels selected. Moreover, testing these effects in a different product category would also alleviate concerns that these effects are driven by the nature of the cleaning product (e.g., soaps).

### Experimental Design and Procedure

Two-hundred and seventy three U.S. residents (59 % male;  $M_{\text{age}} = 34$ ) were recruited from Amazon's Mechanical Turk to participate in an online study for a small monetary compensation (\$1). The study was a 3 (Product Color: Control vs. Non-Green vs. Green)  $\times$  3 (Product Label: No Label vs. Fairtrade vs. Eco-label) between-subjects factorial design. Similar to Studies 1 and 2B, participants were recruited to complete a product evaluation experiment. Each participant viewed an image of a box of Colgate toothpaste. The box either had a dominant non-green color (purple), a dominant green color, or was a no-color control [black and white (B&W)]. On the box was either no additional label, a non-eco Fairtrade label, or an Eco-label (See Appendix 3). Following the product exposure, participants completed the same measures from Study 1 and 2 on perceptions of environmental friendliness ( $\alpha = .95$ ), product efficacy ( $\alpha = .84$ ), and purchase intentions ( $r = .90, p < .05$ ).

The inclusion of the B&W control condition ( $n = 93$ ) afforded the opportunity to go one step further and test whether consumers hold latent associations linking the color green with eco-friendly products. Following the survey instrument, we provided consumers in this condition with a list of eight colors (red, orange, yellow, green, blue, purple, black, and white) and asked them what colors they thought would be featured on the packaging of this

product. Participants could select as many colors as they wanted, including the option of including other colors not listed. We conducted a binary logistic regression with two dummy variables for predicted product color (1 = *Green*, 0 = *Other*) and label type (No Label vs. Fairtrade Label vs. Eco-label) as a predictor variable. The results confirmed that participants were more than four times as likely to suggest the product would be green in color in the eco-label condition, relative to the no label condition ( $B = 1.48$ ;  $SE = .65$ ; Wald  $\chi^2(1) = 5.31$ ,  $p < .05$ , OR (odds ratio) 4.42). In validation of the core prediction that the association between color and label is specific to eco-friendly cues, participants were no more likely to predict the color green in the Fairtrade label condition than in the no label condition ( $B = .85$ ;  $SE = .67$ ,  $p = .20$ ). The results of this supplementary test confirm that consumers indeed associate the color green with eco-friendly products.

## Results

**Perceived Environmental Friendliness.** An analysis of environmental friendliness as a function of color and label revealed the expected main effects of Color ( $F(2, 264) = 5.02$ ,  $p < .05$ ) and Label ( $F(2, 264) = 12.33$ ,  $p < .05$ ). Pairwise comparisons confirmed that the green-colored product was perceived as more environmentally friendly ( $M = 4.62$ ) than both the B&W product ( $M = 4.12$ ; Tukey's HSD,  $p < .05$ ) and the non-green-colored product ( $M = 4.13$ ; Tukey's HSD,  $p < .05$ ). There was no difference in perceptions of environmental friendliness between the B&W and non-green-colored product ( $p = .99$ ). Moreover, pairwise comparisons confirmed that the product with an eco-label was perceived as more environmentally friendly ( $M = 4.78$ ) than both the no-label product ( $M = 3.90$ ; Tukey's HSD,  $p < .001$ ) and the Fairtrade label product ( $M = 4.18$ ; Tukey's HSD,  $p < .001$ ). There was no difference in perceptions of environmental friendliness between the no-label and Fairtrade label products ( $p = .28$ ). Critically, the interaction between label and color on perceptions of environmental friendliness was not significant ( $p = .22$ ). These main effects are consistent with our prediction that the color green and eco-labels independently function as signals of environmental friendliness.

**Perceived Efficacy.** An analysis of product efficacy revealed a significant Color  $\times$  Label interaction ( $F(4, 264) = 3.92$ ,  $p < .05$ ). Simple effects across the label condition supported  $H_{1A}$ . Specifically, in the *no label condition*, the green product was perceived as lower in efficacy ( $M = 5.18$ ) than the non-green product ( $M = 5.84$ ;  $F(1, 56) = 4.34$ ,  $p < .05$ ), but only directionally lower in efficacy than the B&W product ( $M = 5.63$ ;  $F(1, 55) = 1.95$ ,  $p = .17$ ). However, when we accounted

for participants in the B&W condition who believed the product would feature the color green, the difference became significant ( $M_{\text{Green}} = 5.18$  vs.  $M_{\text{B\&W}} = 5.85$ ;  $F(1, 51) = 4.30$ ,  $p < .05$ ). Furthermore, as evidence that efficacy judgments were not being shifted up by the non-green condition, the difference in perceived efficacy between the non-green product ( $M = 5.84$ ) and the B&W control ( $M = 5.63$ ) was not significant ( $p = .46$ ).

In the *Fairtrade Label Condition*, the results took on a similar pattern. Although we had no predictions for how the Fairtrade logo would fare with the inclusion of different cues, we had no reason to believe the color green would be associated with Fairtrade. Thus, we expected to see an efficacy discounting effect in line with the no-label condition. In support of this, the green product was indeed perceived as lower in efficacy ( $M = 5.68$ ) than the non-green product ( $M = 6.22$ ;  $F(1, 61) = 6.88$ ,  $p < .05$ ) but again not lower in efficacy than the B&W product ( $M = 5.30$ ;  $p = .21$ ). Once again, removing those that intuitively linked the B&W to the color green raised product efficacy ratings ( $M = 5.52$ ), though the effect remained non-significant ( $p = .62$ ). Lastly, the perceived efficacy of the non-green product ( $M = 6.22$ ) was higher than that of the B&W control ( $M = 5.30$ ;  $F(1, 61) = 9.43$ ,  $p < .05$ ). Although not predicted, these results highlight a possible alternate association linking purple (the non-green color) to Fairtrade. One of the most prevalent examples is Cadbury, whose trade dress is purple. Cadbury is one of the world's largest confectionary producers and the first to mass-market Fairtrade cocoa using the Fairtrade label across their product lines. Of course, this is merely conjecture, but it is consistent with the notion of using facilitating cues to augment efficacy judgments.

In support of  $H_{1C}$ , in the *Eco-label Condition*, the green product was perceived as actually higher in efficacy ( $M = 5.97$ ) than the non-green product ( $M = 5.41$ ;  $F(1, 58) = 3.20$ ,  $p = .08$ ) but not the B&W product ( $M = 5.66$ ;  $F(1, 60) = 1.65$ ,  $p = .20$ ). We did not expect a difference between the green and control conditions here because so many participants in the control condition believed that the product would contain the color green (removing them would lead to too small a sample to analyze). Nevertheless, not only did the inclusion of corresponding cues mitigate the efficacy discounting effect, but it also even enhanced efficacy judgments relative to the ambiguous (non-green) condition. Once again, as evidence that efficacy judgments were not being shifted up by the non-green condition, the difference in perceived efficacy between the non-green product ( $M = 5.41$ ) and the B&W control ( $M = 5.65$ ) was not significant ( $p = .46$ ).

As a final analysis to explore  $H_{1B}$ , a planned contrast within the non-green condition revealed a significant drop

in perceived efficacy of the Eco-labeled product ( $M = 5.41$ ) compared to a Fairtrade-labeled product ( $M = 6.22$ ;  $F(1, 59) = 6.95$ ,  $p < .05$ ), but was only directionally lower than the no-labeled product ( $M = 5.84$ ;  $p = .21$ ). There was no significant difference between the Fairtrade and the no-labeled product ( $p = .13$ ). These results confirm that the eco-label as an isolated cue yet again incurred an efficacy discounting effect, and importantly, a similar effect was not observed in the Fairtrade logo condition.

**Purchase Intentions.** To test moderated mediation on purchase intentions through perceived efficacy, we once again employed Model 8 in the PROCESS macro for SPSS (Hayes 2008) with 10,000 bootstrapped estimates. When the product was green in color, there was a significant indirect effect of the presence of an eco-label on purchase intentions through perceived product efficacy ( $\beta = .35$ ;  $CI_{95\%} .10-.62$ ). However, when an eco-label was added to either the B&W control condition or the non-green condition, the confidence intervals spanned zero, indicating a non-significant indirect effect ( $\beta_{B\&W} = .02$ ;  $CI_{95\%} -.23$  to  $.27$ ) ( $\beta_{Non-Green} = -.20$ ;  $CI_{95\%} -.51$  to  $.09$ ). This mediation analysis is consistent with the notion that pursuing eco-label certification only has a positive effect on consumers' purchase intentions when there are additional environmental cues present (Table 3).

### Discussion

As with the previous studies, we replicated the effect of isolated environmental cues, which bolstered perceptions of environmental friendliness, but subsequently decreased inferences of product efficacy. Secondary environmental cues were once again demonstrated to mitigate this efficacy discounting effect. Furthermore, by introducing more conservative controls for color (black and white) and label (Fairtrade) into the experimental design, Study 3 offers empirical support which mitigates rival hypotheses. The findings from the B&W control condition showed that consumers are more likely to imagine an eco-labeled product as green. This further reinforces the notion that people maintain these latent associations when accessing the environmental schema.

### General Discussion

Given the increasing prevalence of products that are marketed as environmentally friendly, it is important to understand how environmental cues on product packaging influence consumers' product perceptions. The current work finds that the isolated use of an environmental cue on

product packaging can have deleterious effects on perceptions of product efficacy and subsequently on purchase intentions. More specifically, it demonstrates that the use of the color green or a certified eco-label, in the absence of other supporting environmental cues, negatively impact product efficacy perceptions and, subsequently, purchase intentions (Study 1 and Study 2B). Study 2, in particular, also takes steps to isolate categorization ambiguity as the underlying process driving the effect. Study 3 then replicates this effect while ruling out the alternate accounts of non-green colors positively driving efficacy and halo effects for non-environment-based certification labels. Taking the results together, we present an initial framework for understanding the interplay of certain environmental cues, in this case, the color green and certified environmental labels, and the subsequent downstream effects on product evaluations.

### Implications, Limitations, and Avenues for Future Research

#### *Environmental Cues and Product Evaluations*

The current work makes two core contributions towards enriching our theoretical understanding of consumers' responses to products using environmental cues. First, it identifies the categorization process as an important determinant of how consumers are likely to respond to products that portray environmental cues. This stands in contrast to extant literature, which implicitly assumes that consumers are able to clearly categorize environmentally oriented products as such and that their evaluations are based on assessments of how the product performs within that domain. By challenging this assumption, we are able to integrate the literatures on product efficacy tradeoffs and category inference to develop specific predictions about the role of category ambiguity in shaping consumers' responses to environmental cues. Second, the current work highlights that the interplay between environmental cues on product packaging is influential in shaping consumers' product responses. As noted earlier, previous work typically examines the downstream effects associated with variations in the presentation of a particular environmental cue (e.g., how the degree of argument specificity on an eco-label influences trust: Atkinson and Rosenthal 2014). This approach, however, obscures the potential downstream effects associated with the interactions between environmental cues. Although we focus specifically on the interplay between two particular cues—the color green and eco-labels—this line of inquiry identifies rich avenues for future work. Specifically, it highlights a need to examine the way in which different types of environmental cues might interact with one another to influence consumers' product evaluations.



**Table 3** Study 3 means and standard deviations

Cell mean (standard deviation)	Perceived efficacy	Purchase intentions
No label, control color	5.63 (1.08)	4.73 (1.49)
No label, non-green color	5.84 (1.06)	5.24 (1.39)
No label, green color	5.18 (1.32)	4.76 (1.59)
Fairtrade label, control color	5.30 (1.46)	4.75 (1.81)
Fairtrade label, non-green color	6.22 (0.80)	5.48 (1.12)
Fairtrade label, green color	5.68 (0.83)	5.20 (0.90)
Eco-label, control color	5.66 (1.05)	5.05 (1.42)
Eco-label, non-green color	5.41 (1.49)	4.87 (1.94)
Eco-label, green color	5.97 (0.82)	5.30 (1.17)

One key limitation of the current work, however, is that, despite the vast array of environmental cues used by organizations, we focused only on two—the color green and eco-labels. This was necessary in order to maintain a realistic scope of analysis, but it does restrict the generalizability of our results. Specifically, although we would expect the basic premise to hold across cues (i.e., that isolated environmental cues reduce product efficacy perceptions and purchase intentions due to category ambiguity), additional research is required to investigate this particular issue. It is possible, for instance, that certain environmental cues have unique properties that might overcome the category ambiguity effects associated with being used as an isolated environmental cue (i.e., the cue clearly signals to the consumer that the product can be categorized as environmental even without the validation of additional environmental cues). Alternatively, certain environmental cues might be more compatible with a functionality schema than others and so less vulnerable to the efficacy discounting effects associated with being used in isolation. These are questions requiring further investigation.

#### *Environmental Cues and Schema Activation*

One of our core findings is that an isolated environmental cue, in that it activates an environmental schema that cannot be resolved, leads to lower perceptions of product efficacy and lower purchase intentions. These results have important implications for practice. Specifically, it highlights that companies must identify the types of

environmental cues that are likely to activate an environmental schema, so that, in such cases, they can offer supplementary cues to clearly signal to consumers that the product can be properly categorized as environmental. If they fail to do so, the resulting category ambiguity can reduce efficacy perceptions and subsequent purchase intentions.

Our work provides some initial guidance for companies about certain cues that activate environmental schemas, which should be supported by additional cues to avoid discounting effects. Specifically, we demonstrate that isolated use of the color green, isolated use of certified environmental labels, and priming consumers about the prevalence of environmentally friendly products can all activate environmental schemas. Our findings, however, raise an important question about what other simple cues may do the same. For instance, while we focus on an appearance-related cue, there are other types of sensory cues (e.g., the way the product feels or smells), product-related cues (e.g., shape of the product), and environmental cues (i.e., store where the product is displayed, other products on the shelf, green walls in the store) that seem likely to similarly activate an environmental schema. With regards to the latter, for example, perhaps consumers are more likely to experience category ambiguity when they see an environmental claim on a product in a store that is typically known for low prices (e.g., Walmart) rather than an identical product in a store that is recognized for its commitment to environmental friendliness (e.g., Rona). In this case, shopping at Rona may naturally activate an environmental schema, and so green is perceived as a

substantiating cue negating the greenwashing penalty. In contrast, the low-price schema activated by Walmart may be such that the color green leads to category ambiguity and the associated negative effects on product quality perceptions.

Going forward, in order for firms to develop environmental products that will be well-received by consumers, it is critical to examine the scope of environmental cues, beyond those on the product itself, that stand to activate environmental schemas. Such information will be invaluable in helping companies develop sustainability-oriented products and product packaging that can be clearly categorized by consumers as such. More generally, additional research is certainly required to understand not only which cues activate environmental schemas and which cues best align with that schema but also what strategies can be used to manage perceptions of environmental cues.

The nature of the product and how it is consumed is also likely to influence the interplay between environmental cues and quality perceptions. There are certain aspects of the public consumption context that are likely to strongly influence this relationship. Specifically, the public consumption domain, unlike private consumption, introduces concerns of social signaling and impression management. Within the domain of environmental consumption more specifically, Griskevicius et al. (2010) highlight a phenomenon that they refer to as “going green to be seen.” It argues that environmentally friendly purchases, in that they can be construed as altruistic, are motivated at least in part by consumers’ desire to bolster status. The logic here is that environmentally friendly products often cost more and are geared to benefit others such that consumers who choose to purchase them attempt to send a costly signal, a wastefulness in resources that bolsters one’s status. As product attribute visibility increases, observers should be more likely to see the product as a signal, which can have unintended negative consequences for both the owner and product evaluations. Isolated environmental cues may be construed as effortful signaling, which can trigger reduced perceptions of product quality.

### *The Color Green*

Our research also highlights the unintended consequences of the color green. As noted earlier, green is often used synonymously with environmental friendliness. And, yet, the interplay of the color green with other environmental cues, and also its role in shaping consumers’ product evaluations has gone largely unexplored. What are the consequences of this close relationship between green and environmental friendliness? Across our studies, we find evidence that using the color green on product packaging

(or, in the case of Study 2, for the color of the product itself) has meaningful implications for product evaluations. Specifically, we find that simply using the color green in the absence of additional environmental cues negatively impacts product efficacy perceptions. These results have some interesting implications for companies. Our results suggest that the color green has become so intertwined with environmental associations that the simple presence of the color can activate an environmental schema for the consumer. This is important because, if an environmental schema is activated but not substantiated by other cues, it can have deleterious effects on product efficacy perceptions and purchase intentions. Accordingly, companies should think carefully about how they use even subtle environmental imagery in products because, even if they are not attempting to communicate environmental information, or rather even trying to convey other product information (e.g., product use, product flavor), such imagery may negatively influence product evaluations.

Another important avenue for future research going forward is to examine additional downstream consequences associated with the color green. As noted above, this research highlights how the prevalent use of the color green to both verbally (statements of “being green” are used to indicate environmental friendliness) and visually (environmental products disproportionately rely on green packaging) signal environmental friendliness has meaningful implications for consumers’ product evaluations. Given the nascent area of work on the color green and its relationship to product evaluations, we limited the scope of the current work to the effect of the color green on efficacy perceptions and purchase intentions. As expected, efficacy perceptions mediated the influence of the color green on purchase intentions. Identifying other factors here would importantly shed further light on the relationship between the color green and purchase intentions.

A key limitation associated with our examination of the color green and its effect on consumers’ product evaluations, however, is that we were not able to engage in in-depth comparison between the responses triggered by the color green and those triggered by other colors. Specifically, in each study, we compared only one shade of green to one other color (either blue, orange, or purple). A more exhaustive analysis would include both more extensive consideration for the specific shade of green (e.g., perhaps certain shades of green are more central to environmental schemas and others are not actually linked to those same schemas) and more extensive consideration of comparison colors. Additional consideration for whether other colors with links to nature (e.g., brown) might similarly lead to quality discounting effects would also have helped to strengthen the robustness of the study.

### *Eco-labels*

Our research finds that one effective strategy that companies can use to mitigate the negative effect of the color green on product efficacy perceptions and, subsequently purchase intentions, is to add an eco-label. However, it also suggests that organizations should be cautious of using eco-labels in isolation as they may lead to reduced perceptions of product quality and lower purchase intentions. Although we used a certified eco-label in our study, a core limitation of our work is that we did not investigate whether participants understood that Ecologo was a legitimate certification program nor whether consumers understand the requirements that an organization must satisfy in order to be certified. Future research is needed to examine whether the addition of *any* third-party certification (or any eco-label for that matter) mitigates the greenwashing discount or whether consumers are able to recognize legitimate certifications. This is an important question given that a recent report by TerraChoice (2010) notes the use of illegitimate, self-declared eco-labels as an increasingly prevalent greenwashing strategy.

Educating and involving consumers in environmental issues is critical to them being able to recognize sustainability claims. A potentially perilous result of not educating and involving consumers is that they will not be equipped to acknowledge and reward those companies who pursue legitimate certification. As such sincere environmental organizations will incur the greater administrative and financial costs associated with pursuing genuine environmental certification, while other organizations reap similar benefits by creating their own logo (e.g., Proctor and Gamble's Future Friendly product logo). Additional research into consumer perceptions of the credibility of certification programs is warranted as environmental advocates and regulatory bodies continue to struggle to equip consumers with tools to protect themselves from greenwashing efforts. An investigation is merited into the cues consumers use to infer credibility based on the logo (e.g., colors, graphics, text) to signal relevance and truthfulness of a certification program, as well as the threshold required to differentiate between them.

Central to the previous comments is the importance of educating and involving consumers in environmental issues. Fortunately, more ways are emerging by which consumers can educate themselves about green product claims and become equipped to be skeptical. Certification organizations offer credible signals for green claims and are becoming widespread across many industries, including Leadership in Energy and Environmental Design (LEED) for buildings and homes, ISO 14000 for businesses operations, and Environmental Choice to identify products and services which are less harmful to the environment. The Federal Trade

Commission (FTC) has published 'Guides for the Use of Environmental Marketing Claims', which are currently undergoing review. The general principles they advocate anchors on qualifications and disclosures, distinction between benefits of product, package, and service (which can help mitigate broad green claims based on minor, incidental components), overstatements of environmental attributes (i.e., moving from 2 to 3 % recycled material and labeling 50 % more recycled material than before), and comparative claims (which require brands to substantiate comparison condition of claims). Finally, whereas we focus on the implications of environmental versus functionality category ambiguity at the product-level (i.e., perceptions of product efficacy), further research is needed to investigate whether such perceptions may also impact consumers' brand-level, firm-level and institutional level evaluations.

Another key limitation of the current work is that it operationalized the eco-label environmental cue using one specific eco-label (the certified logo of the Ecologo Program). We would expect, based on our conceptual framework, for our results to hold across different types of eco-labels but we unfortunately cannot speak directly to this issue. It is possible for instance, that certain types of eco-labels will be perceived as particularly credible and so will not need the validation of other environmental cues to confirm categorization as a sustainable product. Additional research is needed to address this important question. More broadly, additional research is needed to investigate how our results fit within the broader body of work on certification labels.

The literature on certification labels identifies a wide range of labels that organizations use to signal various ethical qualities about their products (e.g., ethical sourcing, fair-trade, energy efficiency, labor practices, animal rights, environmental orientation, etc.), and examines how consumers interpret and respond to such labels with regards to issues such as organizational trust (e.g., Castaldo et al. 2009), willingness-to-pay (e.g., De Pelsmacker et al. 2005; Mahé 2010; Trudel and Cotte 2009), moral affective evaluations (e.g., Bradu et al. 2014) and perceptions of quality (e.g., Lin and Chang 2012; Moore and Carpenter 2008). This work finds great variations in consumers' responses, depending on the specific nature of the label, how it is used, the nature of the product and the actual ethical quality of emphasis.

Although we cannot speak directly to how the isolated use of such varied ethical cues will influence consumers' product evaluations, our results do provide some theoretical guidance for investigating these issues. Consider, for instance, that our found effects are argued to occur because the isolated environmental cue activates a schema (i.e., in this case an environmental schema) that is incompatible with a product functionality schema. This argument is based on a robust literature demonstrating that consumers have difficulty reconciling this schema with product

functionality (e.g., Luchs et al. 2010, 2012; Lin and Chang 2012). Extending this logic to the domain of ethical cues more broadly, we might expect our effects to hold in cases where the schema associated with the ethical quality is perceived as incongruous with the functionality schema. That is, we would expect efficacy discounting effects to occur in cases where the isolated ethical cue in question activated a schema that was perceived to be incompatible with the product’s ability to sufficiently fulfill its primary operating characteristic. As such, future research should investigate whether consumers’ knowledge structures regarding other ethical qualities (e.g., animal rights, fairtrade, labor standards) are similarly incompatible with perceived functionality. Although we do not examine fairtrade labels in-depth, the results of Study 3 speak to the potentially important dynamics between functionality and fairtrade. In cases where the schemas are incompatible, our research would suggest that consumers will hold lower perceptions of product efficacy and lower purchase

intentions. In cases where the schemas are compatible, however, we would expect no such deleterious effects associated with the use of isolated ethical cues. Additional research in this regard would greatly enhance our understanding of certification labels. Further, whereas the extant work on certification labels (including the current work) typically focuses on consumers’ responses to one particular form of certification (e.g., Atkinson and Rosenthal 2014; Peattie 2010; Stefan and Paul 2008; Teisl et al. 2008), this approach would go towards developing a unifying framework for understanding certification labels.

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**Appendix 1—Study 1 Product Stimuli**



**Appendix 2—Study 2 Product Stimuli**



\* In Experiment 2 (Part A) participants were asked to either evaluate the orange-scented/apple-scented dish soap (for each respective color) or simply to evaluate the dish soap

\*\* In Experiment 2 (Part B) participants were primed prior to product exposure

### Appendix 3—Study 3 Product Stimuli



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