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Milica Mladenovic, Hans van Trijp & Betina Piqueras-Fiszman

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(Un)believably Green: The Role of Information Credibility in Green Food Product Communications

Milica Mladenovic, Hans van Trijp and Betina Piqueras-Fiszman

Marketing & Consumer Behavior Group, Wageningen University, Wageningen, The Netherlands

ABSTRACT

This research explored how variations in green information influence consumer responses to green food packaging. Study 1 ($N = 355$) addressed how consumers evaluate packaging sustainability given the interplay between source cues, claim cues and the order of cue presentation. Study 2 ($N = 546$) additionally investigated the role of product cues (namely, naturalness) in sustainability evaluations of green packaging. Both studies examined perceived credibility of green information as the underlining mechanism explaining packaging cues' effects on perceived sustainability. Overall, consumers valued green communication using credible cues on packaged foods but they also: (1) appreciated higher cue quantity, (2) did not penalize communications using low credibility cues, and (3) evaluated green packaging information swayed by product cues.

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Green communication; packaging; source cues; claim specificity; marketing

1. Introduction

Consumers prefer and are more willing to purchase sustainable products than conventional alternatives (Bianchi et al., 2022). To capitalize on consumers' interest in sustainability, companies communicate products' green attributes on packaging labels, through combinations of packaging cues (Seo & Scammon, 2017). This information forms consumer expectations (Steenis et al., 2023) and purchase intentions about the product (Orth & Malkewitz, 2008; Steenis et al., 2017). However, communicating green attributes is challenging, as more than 50% of consumers do not believe the green information companies communicate on their products (Euroconsumers, 2021). Such considerable degree of consumer distrust increases the importance of investigating how consumers decode the interplay between green packaging cues into sustainability evaluations.

Sustainability is a credence attribute whose accurateness or sincereness consumers cannot directly verify (Grunert et al., 2014). An important component of credence-based information is its perceived credibility, because people use credibility evaluations as a strategy to help them decide how relevant the presented information is (Wathen & Burkell, 2002). When direct verification is not an option, credibility becomes crucial for consumer decision-making (Eisend, 2002). This places credibility – a perception of expertise and trustworthiness of information or its source (Eisend, 2002; Metzger, 2007) – central to packaging cues' ability to influence sustainability perceptions.

This research builds a conceptual framework to assess how consumers integrate green packaging information into judgements. Study 1 explores how sustainability evaluations are formed given the

CONTACT Milica Mladenovic milica.mladenovic@wur.nl Marketing & Consumer Behavior Group, Wageningen University, Hollandseweg 1, 6717 KN Wageningen, The Netherlands

interplay between green source cues (i.e. the type of entity certifying the packaging's sustainability) and claim cues (i.e. informational text on sustainability). We argue that consumers reach sustainability evaluations in a sequential information search process whereby perceived credibility of the first processed cue determines the added weight subsequent green cues will have for evaluations. Therefore, perceived credibility of green information – especially that of the first processed cue – governs the outcome of the interplay between green source and claim cues on sustainability evaluations. Study 2 investigates how consumer perceptions of products' naturalness (i.e. its perceived closeness to nature) influence packaging sustainability evaluations, as well as consumer attitudes about the packaged product. Here, we propose that consumers' evaluations of green packaging information are inherently linked to product cues, as packaged products are evaluated holistically.

Our research's theoretical contribution stems from examining how consumers integrate pieces of information that appeal to different information processing routes into judgements, providing insights into how they prioritize and understand green information. Moreover, we assess the boundary effects of these cue interactions in efforts of grasping which circumstances and what formats of green information are most likely to be successful. We also put forth perceived credibility as one potential mechanism that could explain why certain green packaging cues lead to more positive product evaluations. Practically, our research helps marketers gauge the relative impact of green cues on evaluations, crucial for preventing consumer overload and unfavorable responses when sharing environmentally friendly information across multiple channels (Marzi, 2022). Additionally, it offers guidelines relevant for the design of more persuasive and credible sustainability communication in the food industry, which could have a direct contribution to more sustainable consumer choices and behaviors.

2. Theoretical background

In the domain of persuasive communication and decision-making, the Elaboration Likelihood Model (ELM) serves as one of the fundamental frameworks for elucidating the processes governing judgment and persuasion. The ELM delineates two distinct routes to persuasion: the central route, characterized by deliberate analysis of message content, and the peripheral route, influenced by superficial cues (Petty & Cacioppo, 1986). Along the central route, individuals engage in thoughtful evaluation of arguments, forming judgments grounded in content merits (Petty & Wegener, 1999). Conversely, the peripheral route relies on heuristics and mental shortcuts, where factors like the source of the message play a significant role (Briñol et al., 2011).

Source and claim cues communicate information to consumers via different processing routes (Underwood & Klein, 2002). Source cues require little cognitive resources and are fast to process (Chaiken & Ledgerwood, 2012), impacting consumer evaluations through established heuristics (Luna et al., 2003). Claim cues are primarily processed through the central route, requiring consumers' involvement and dedication of cognitive resources to reach an evaluation (Fogg & Hsiang, 1999).

Both source and claim cues can improve consumers' evaluations of the product and the brand (e.g. Brach et al., 2018; Olsen et al., 2014). Source cues were found to boost evaluations of products' eco image, brand attitudes and intention to buy (e.g. Atkinson & Rosenthal, 2014; Liu et al., 2017). These links were established using various sources to communicate green improvements related to energy saving (e.g. EU Energy Rating Label), deforestation (e.g. FSC logo) and, most often, food (e.g. EU organic logo and German Bio-Siegel logo) (Darnall et al., 2018; Janssen & Hamm, 2012). Similarly, condensed textual information consumers receive via packaging claims can also lead to positive responses (Osburg et al., 2016; Rettie & Brewer, 2000). Indeed, consumers prefer and are more willing to buy products with than without green claims (Atkinson & Rosenthal, 2014; Kao & Du, 2020).

Consumers value sustainability improvements more when companies improve credibility of the green information the products communicate (Atkinson & Rosenthal, 2014). For instance, governments or third-party certified source cues are perceived as more credible than corporation issued source cues (Darnall et al., 2018; Moussa & Touzani, 2008). Consumers generally consider governments and third party sources more trustable because such certifications testify that the product met certain criteria that were consequently objectively evaluated by an independent entity (Darnall et al., 2018; Finch et al., 2015). Furthermore, consumers believe that independent entities have no ulterior motives to make a profit out of selling products with such certifications (Busch & Jörgens, 2005). Subsequently, consumers prefer products incorporating certified source cues over those incorporating corporation certified source cues (e.g. Atkinson & Rosenthal, 2014; Brach et al., 2018; Ketelsen et al., 2020).

Considering credibility of textual cues, the specificity of green claims is an important factor. Consumers prefer claim objectivity and good argumentation quality and strength (Alniacik & Yilmaz, 2012) because they provide concrete reasons to believe the communicated improvements. Presenting highly specific, as opposed to vague and unspecific green claims not only increases credibility of the claim but leads to higher willingness to buy and more positive attitudes towards these companies (Ganz & Grimes, 2018; Jäger & Weber, 2020).

Taken together, it is known that both green source and claim cues independently improve consumers' responses, especially when perceived as credible. Yet, these insights were largely drawn from isolated research contexts, studying the effect of each cue independently and often in reference to products without green information altogether (e.g. Busch & Jörgens, 2005; Ganz & Grimes, 2018). Therefore, the understanding of the cue interplay remains limited.

Notable exceptions studying cue interplay include the work of Atkinson and Rosenthal (2014), who examined the influence of label specificity and source cues on overall consumer evaluations of packaged products. Here, consumers generally placed more trust and held more favorable attitudes towards products that provided specific on-label information and originated from certified sources. Similarly, Ischen et al. (2022) investigated the combined effects of sustainable packaging materials and logos, again finding that each cue independently improved sustainability evaluations. Lastly, Spack and colleagues (2012) studied how argument strength and imagery influence evaluations of product greenness and purchase intent, observing similar effects as Ischen et al. (2022). Spack and collagues (2012) furthermore speculated that the two cues might additively affect perceived attitudes towards the product. However, none of the studies noted significant effects resulting from cue interplay, nor inspected which underlining mechanisms could explain the observed effects. Other related studies add complexity to the topic, generating mixed results and deepening the cue interplay ambiguity. Seo and Scammon (2017) observed that beverages in green bottles, displaying a green claim, were perceived as environmentally superior compared to drinks in differently colored bottles featuring the same claim. Conversely, Granato and colleagues (2022) discovered that green colored packaging, combined with a green claim, had adverse effects on consumer evaluations of pre-packaged salads. These studies, too, did not explore the potential underlining mechanisms influencing consumer evaluations.

2.1. The effect of the source and claim cue interplay on credibility

Existing theories that could help explain the source-claim cue interplay focus on how the number of cues affects consumer responses. The Elaboration Likelihood Model (Petty & Cacioppo, 1986) and The Information Theory (Shannon, 1948) suggest that using several green cues provides more information, making the message of sustainability more salient. Previously mentioned findings of Seo and Scammon (2017) support this, reasoning that green color (as opposed to red or yellow) enhances the meaning of the sustainability message. The implication here is that sustainability information is best processed when there is conceptual fluency between message content and the symbolic meaning of the color. Thus, both cues communicate sustainability in an additive, "more is merrier" fashion.

The Embedding Effect (Kahneman & Knetsch, 1992) reasons in the "less is more" direction. It suggests that consumers are prone to value each two or more green cues less saliently when presented together than separately. It further assumes that one green cue already activates moral satisfaction – which is believed to be the reason why consumers appreciate sustainable products. Adding subsequent cues results in several cues sharing the same degree of moral satisfaction that one cue previously activated on its own (Irwin & Spira, 1997; Kahneman & Knetsch, 1992). Therefore, combining several green cues may backfire on sustainability evaluations. Per this reasoning, Granato and colleagues (2022) found adverse effects on sustainability evaluations when cues were combined. The authors theorized that the counterproductive effect stems from green overload, whereby the abundance of information resulted in consumers questioning the products' real environmental benefit.

We propose that sustainability evaluations depend on perceived credibility of green information rather than the mere number of presented cues. When cues compete for consumers' attention, we argue that perceived credibility of the first processed cue determines whether sustainability will be communicated in a "more is merrier" or "less is more" fashion. This makes perceptions of the first processed cue crucial. Indeed, consumers tend to simplify their judgement making by selectively using the first piece of processed information to build expectations (Sanbonmatsu et al., 1998). This strategy evolved due to time restrictions, abundance of choice, and information overload that consumers face in every-day consumption contexts (Mick et al., 2004). These considerations highlight the weight of the initially processed information, which acts as an "anchor" for consumers' judgement making and therefore introduces order of information processing as a relevant factor.

Our "quality over quantity" argument aligns with the idea that the initial cue has an anchoring effect on the cue interplay outcome. When initial information appears highly credible, consumers usually do not search for additional information to corroborate their perceptions (Tucker et al., 2012). Conversely, consumers typically seek more information when unsure about the credibility of the initial information (Sinaceur, 2010). Following this rationale, if the initially processed information is deemed insufficient, consumers are likely to seek out more cues. We therefore anticipate that "more is merrier" when the first processed cue is perceived as lacking credibility, and "less is more" when the first processed cue is perceived as sufficiently credible.

The "quality over quantity" argument also considers varied judgement strengths stemming from processing differences between the two ELM routes. Specifically, deliberate allocation of attention and thorough cognitive engagement with information should form more robust and enduring attitudes – inherent to central information processing (Petty & Wegener, 1999). Extensive elaboration of information also enhances individuals' confidence in the conclusions they draw from said information (Briñol et al., 2011). Therefore, it can be deduced that cues designed to engage central (i.e. claim cues) rather than peripheral (i.e. source cues) information processing routes generally convey green information with heightened credibility to consumers. Furthermore, it becomes reasonable to anticipate that if this greater credibility is attributed to the initially processed cue, consumers' subsequent need for additional information search will also be reduced.

In summary, our reasoning is built on three core assumptions. *Specifically*: sustainability evaluations involve a sequential information search process. The credibility of the first processed cue is pivotal in influencing subsequent evaluations. And finally, centrally (versus peripherally) processed cues generally carry more influence in consumer evaluations due to differences in nature of their information processing and need for additional information after. Altogether, we hypothesize that:

H1: Source cues will lead to more information search than claim cues.

H2: For both cue types, less credible cues (i.e. corporation certified source cues and low specificity claims) will lead to more information search than more credible cues (i.e. government certified source cues and high specificity claims).

H3: Perceived credibility of green information will mediate the relationship between (a) source and (b) claim cues and perceived sustainability of the packaging, more credible cues leading to higher perceptions of sustainability.

If consumers judge the first processed cue as sufficiently credible, then this cue likely determines the overall perceived credibility of green information in the presence of two (or more) cues too. We expect that *adding a high credibility* second cue will constitute a considerable benefit in terms of improved credibility evaluations of green information *if* the first cue is low in credibility. *If the second cue is low in credibility*, however, its expected role will not be in improving credibility evaluations of green information. Instead, the low credibility of the second cue will do harm by decreasing the credibility of green information, but only if the first cue is also low in credibility. Namely:

> H4a: If the first processed cue is low (versus high) in credibility, adding a high credibility second cue will result in a larger increase in credibility of green information.

> H4b: If the first processed cue is low (versus high) in credibility, adding a low credibility second cue will result in a larger decrease in credibility of green information.

3. Study 1

3.1 Methods

3.1.1 Participants and design

For a small compensation, responses of 362 British consumers were collected online using Prolific – a crowdsourcing platform. Per our pre-registration (see https://aspredicted.org/3MK_VKR), consumers whose response time was 3 standard deviations away from the average were removed from the sample. The final sample consisted of 355 consumers ($M_{age} = 36.85$, $SD = 13.8$; 49.58% female, 66.76% holding a bachelor's degree). The study involved a 2 (source cue: government versus corporation certified) x 2 (claim cue: high versus low specificity) x 2 (order of cue presentation: source cue versus claim cue first) between-subject design. Study conditions did not significantly differ in consumers' age ($F(7, 347) = .95$, $p = .47$), gender ($X^2(14, N = 355) = 13.20$, $p = .51$) or education ($X^2(21, N = 355) = 30.06$, $p = .09$). The study received the Ethical approval from Wageningen University & Research.

3.1.2. Stimuli

The manipulated stimuli were the source and specificity of claim cues (see Figure 1), both of which were separately piloted before ($N = 78$ and $N = 60$, respectively). Source cues were manipulated with a logo that was either third-party government agency or corporation issued. Like Atkinson and Rosenthal (2014), the source cue design was kept constant, while the source itself varied. Government certified source was The European Environment Agency, and corporation certified source was Aldi. Claims were manipulated to be high or low in specificity. High claim specificity provided concrete information about the packaging improvements to sustainability (i.e. "Biobased packaging made entirely from renewable plant-based fibres"). Low specificity claims built on the same context

Figure 1. Study 1 stimuli.

the high specificity claims did but provided no details how packaging sustainability was achieved (i.e. "Green packaging made entirely from sustainable materials").

3.1.3. Procedure and measures

After agreeing to participate, consumers received a definition of packaged foods' environmental sustainability to ensure that evaluations of green information aligned with this specific sustainability aspect. They were then randomly assigned to a condition and asked to imagine shopping for mushrooms at a local supermarket. To avoid negative consumer reactions towards products whose packaging is perceived as excessive *(*Hoppe & Kleinen-von Königslöw, 2023*),* mushrooms were chosen as stimuli. They fit both relevant criteria: being predominantly packaged in plastic trays in British supermarkets and being fresh and minimally processed. Depending on cue order presentation, consumers either saw a source or claim cue on packaging design. They then evaluated how credible they found the presented green information, measured with one item: "How credible do you think the information about sustainability of these packaged mushrooms is?", on a 7-point scale ranging from 1 (not at all credible) to 7 (very credible). Following, consumers rated packaging sustainability with one item: "How sustainable is this mushroom packaging to you?", on a 7-point scale ranging from 1 (not at all sustainable) to 7 (very sustainable; Granato et al., 2022). Furthermore, the need for additional information was evaluated in terms of information adequateness with one item adapted from Menon and Soman (2002): "How adequate is this information to make an accurate sustainability evaluation?", on a 7-point scale ranging from 1 (not at all adequate) to 7 (very adequate). Afterwards, a second cue was added in addition to the initially presented cue (i.e. a source cue or a claim cue, depending on whichever the consumers did not yet see). Consumers then re-evaluated perceived credibility and sustainability. The study concluded with two manipulation checks adapted from Atkinson and Rosenthal (2014) and questions about age, gender, and education. The strength of the source manipulation was measured by asking "Which entity issued the logo you just saw?" whereby government and corporation/company were the possible answers. The claim manipulation's strength was measured by asking "How detailed was the information in the claim you just saw?" on a 7-point scale, ranging from 1 (not at all detailed) to 7 (very detailed).

3.1.4. Data analysis

Hypotheses 1 and 2 were tested with t-tests. In H1, the need for additional information after source cues versus claim cues presentation was compared. In H2, two t-tests were used. The first compared the difference in need for additional information between government and corporation certified source cues. The second compared the difference in need for additional information between high and low claim specificity cues. The mediating effect of perceived credibility of green information on the effect of packaging cues on perceived sustainability (i.e. hypotheses H3a and H3b) was tested with a structural equation model (SEM) (Rosseel, 2012). Direct, indirect, and total effects were specified at the same time. Final evaluations of perceived credibility and sustainability were specified as the model's mediator and the dependent variable. Independent variables were source cues and claim cues. Bootstrapping procedures provided confidence intervals.

To answer H4a and H4b, we specified the interaction between source cues, claim cues, and the order of cue presentation as the predictor in an ANOVA model. The dependent variable was the difference between the final and initial credibility evaluation. Because of the selectivity of H4a and H4b predictions, there was no dependence on the overall significance of the three-way interaction. Instead, we focused on the specific post-hoc pairwise comparisons. Data were analyzed using R programming language (R Core Team, 2020).

4. Results

4.1. Manipulation checks

Manipulations were successful: most consumers were able to identify the issuer of the source cue correctly ($X^2(1, N = 355) = 116.89, p < .001$) and claim cues were perceived as more detailed in the high ($M = 4.38$, $SD = 1.38$) than in the low ($M = 4.08$, $SD = 1.47$, $t(351.44) = 1.96$, $p = .05$) specificity condition.

4.2. The effect of cues on additional information search

H1 was supported. Irrespective of both cues' content, presenting source cues led to significantly higher need for additional information search than presenting claim cues did ($\Delta M = .56$, $t(353) = 3.15$, $p = .002$).

H2 stated that low credibility cues would lead to more need for additional information than high credibility cues. Indeed, corporation certified source cues and low claim specificity cues led to more need for additional information than government certified source cues ($\Delta M = .62$, $t(175.94) = 2.53$, $p = .01$) and high claim specificity cues ($\Delta M = .64$, $t(173.38) = 2.62$, $p = .01$). Thus, the need for additional information was significantly lower when high credibility cues were used to communicate green information, supporting H2.

4.3. The mediating role of green information's credibility in sustainability perceptions

Regarding H3a and H3b, both source and claim cues significantly contributed to packaging sustainability evaluations, albeit in different ways. The total effect of source cues on perceived sustainability was significant ($\beta = .29$, $p = .04$, 95% CI [.08, .51]), in the expected direction of high credibility source cues increasing sustainability evaluations more than low credibility source cues. This effect was entirely carried out through perceived credibility of green information ($\beta = .37$, $p = .007$, 95% CI [.01, .58]), as the direct effect of source cues on perceived sustainability was not significant ($p = .97$). This full mediation therefore supported H3a. The total effect of claim cues on perceived sustainability was also significant ($\beta = .54$, $p < .001$, 95% CI [.26, .83]), high credibility claims increasing sustainability evaluations more than low credibility claims. This effect was carried out through both significant direct ($\beta = .28$, $p = .003$, 95% CI [.10, .47]) and indirect effects ($\beta = .26$, $p = .02$, 95% CI [.05, .48]). Thus, claim cues influenced perceived sustainability, the effect being partially mediated through perceived credibility of green information and supporting H3b.

4.4. The effect of cue interplay on credibility

H4a stated that if the first cue was low (versus high) in credibility, adding a high credibility second cue would result in a larger increase in perceived credibility of green information. Despite the three-way interaction between source cues, claim cues and the order of cue presentation being overall insignificant ($F(1, 347) = 5.44$, $p = .09$), post-hoc tests were carried out to inspect the specific pair-wise comparisons of interest. Of two, one comparison was significant (Figure 2, panel b). Partially supporting H4a, we found that if the first cue was low (versus high) in credibility, adding a high credibility source cue increased credibility evaluations significantly more ($\Delta M = .65$, $p = .02$, 95% CI [.09, 1.21]). This effect was not observed when the second cue was a high credibility claim.

H4b stated that if the first cue was low (versus high) in credibility, adding a low credibility green cue would result in a larger decrease in perceived credibility of green information. Neither of two pairwise comparisons were significant. Notably, however, mean increases in perceived credibility were found with the addition of the low credibility cue. This indicates that less was *never* more, as consumers did not penalize the addition of low credibility cues with lower evaluations of credibility under no circumstances.

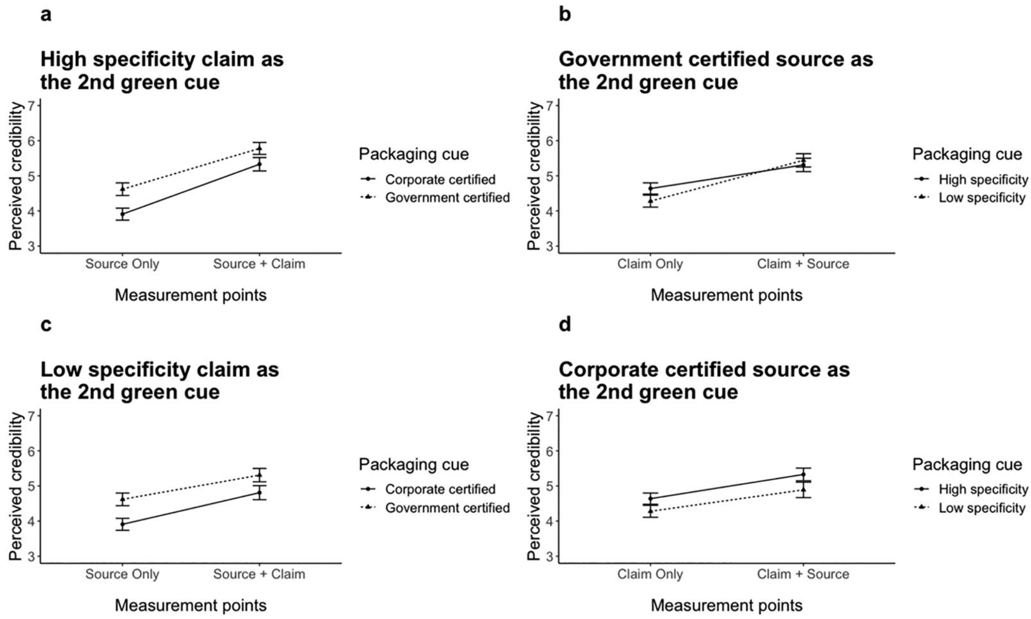

Figure 2. The effect of adding a second cue on perceived credibility of green information. Note. Panels a and b summarize H4a. Panels c and d summarize H4b.

5. Study 1 discussion

Study 1 supported our reasoning that packaging sustainability evaluations are reached in a sequential information seeking process. Extending on Ischen et al. (2022) findings, we identified perceived credibility as an important mechanism explaining packaging cues' ability to influence perceptions of sustainability. This was especially true in the case of source cues, whose entire effect on perceived sustainability was gained through perceived credibility of green information. Overall, increasing the number of cues always improved sustainability evaluations, but the extent of the benefit of the second cue depended on perceived credibility of the first – in line with the "quality over quantity" reasoning.

While this study clarifies how consumers evaluate packaging sustainability given the available green information, it does not consider the role of the product in this process. Product cues (such as product (un)naturalness) are likely important in this context because packaging is a collateral of product purchases and consumers typically evaluate packaged food products holistically (Magnier et al., 2016). Indeed, green packaging information depends on product-related inferences. In Steenis et al.'s (2023) study, consumers perceived advertisements as more deceptive when sustainable packaging did not contain a sustainable product. Addressing this consideration might explain why consumers never penalized green information with lower evaluations of credibility. Specifically, it is possible that consumers processed green information's content more peripherally because inferred product cues (the content were mushrooms) were congruent with the notion of sustainability green packaging information was communicating.

6. Study 2

With Study 2, we tested the role of product cues (namely, product naturalness) in relation to packaging cues' effect on green information's credibility. Furthermore, to comprehensively evaluate the central concept in our studies, perceived credibility was measured using a different, previously evaluated credibility scale. We also extended the conceptual model to consider how credibility of green information and packaging sustainability influence consumers' overall attitudes – a proxy for consumer behaviors – about packaged products (Figure 3 shows the full model).

6.1. The role of product naturalness

Consumers navigate their evaluations guided by mental schemas activated by available information. These mental schemas are cognitive structures that allow individuals to organize existing knowledge and interpret new information by comparing it with what they already understand (Fiske & Taylor, 1991). Mental schemas related to both product and packaging are interconnected and sometimes share overlaps due to content similarities (e.g. emphasizing sustainability benefits) or their typical coactivation. Reinforced by green information on the packaging, consumers might turn to additional contextual cues for validation or contradiction. Most often, these cues originate from closely linked conceptual entities, like the product itself (Steenis et al., 2023).

The (in)congruency between product and packaging cues, driven by these mental schemas, plays a role in influencing how consumers process green information. According to the ELM, cue congruency creates conceptual fluency (Hur et al., 2020), nudging consumers to process information peripherally, by relying on their habits and entering automatic states (Petty & Cacioppo, 1986). This may reduce their inclination to challenge the information's status quo (Granato et al., 2022), potentially also hindering the detection of credibility nuances in the presentation of green information. Conversely, cue incongruency prompts deeper thinking (central processing; Briñol et al., 2011). This natural human tendency is driven by the motivation to make sense of conflicting information, even if it requires more cognitive effort (Petty & Cacioppo, 1986). For example, individuals invest more time in assessing and better remember arguments contradicting their attitudes (Briñol et al., 2011) suggesting that the empirical evidence supports the idea of more thoughtful consideration in the presence of information discrepancies. If these principles apply to information on packaged products, cue incongruence should stimulate consumers to scrutinize green information more closely, hence enhancing the detection of credibility nuances.

The association closest to the concept of sustainability is likely that of nature and nature experiences (Tobler et al., 2011). Consequently, products perceived as highly natural, like fresh food items (e.g. mushrooms in Study 1), innately align product and packaging cues. This cue congruency should thus promote peripheral processing of green information. Conversely, for less natural products (e.g.

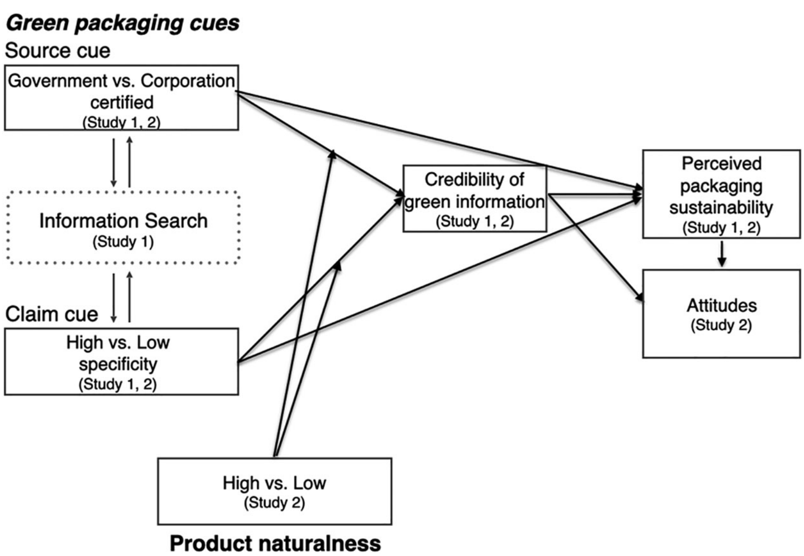

Figure 3. Full conceptual model.

heavily processed items), incongruencies between product and packaging cues might steer consumers towards central processing of green information. We explore this, hypothesizing that:

> H5: The effect of the second cue on credibility evaluations of green information (i.e. H4a & H4b) is stronger when the product is low (versus high) in naturalness.

6.2. Consumers' attitudes about green packaged products

Sustainability drives positive consumer attitudes about food products. For example, consumers are more positive about organic over non-organic vegetables or local over internationally grown fruit (e.g. McCarthy, 2015; Meyerding et al., 2019). Admittedly, sustainability aspects of the actual product are more central to consumers' decision making (Skard et al., 2021), and thus contribute more meaningfully to consumer attitudes about packaged products. However, we propose that positive attitudes about packaged products can also stem from moral satisfaction of exercising sustainability (Kahneman & Knetsch, 1992) peripherally, via packaging for instance. Communicating these sustainable aspects using credible information can further add to positive attitudes, as consumers can more easily be persuaded of the importance of the message when it is credible (Zhang et al., 2016). Hence, credible information likely increases consumers' appreciation of the packaged product beyond influencing the perception of sustainability. Considering these arguments, we hypothesize that:

> H6: Higher perceived credibility of green information and perceived sustainability of the packaging will lead to more positive attitudes about the packaged product.

7. Study 2 methods and results

Identical to Study 1, 563 consumers were recruited via Prolific, 17 of which were excluded[1], resulting in 546 consumers ($M_{age} = 39.54$, $SD = 14.13$; 50.73% female, 43.40% holding a bachelor's degree). Additional to experimental conditions from Study 1, product naturalness (high versus low) was added as a between-subjects factor. To operationalize product naturalness, two products were selected: fresh mushrooms for the high naturalness condition, and pink-frosted, pre-made cookies for the low naturalness condition (see Figure 4). Source and claim cue manipulations were kept identical to those in Study 1. Alike Study 1, Study 2 conditions did not significantly differ from each other in consumers' age ($F(7, 538) = 1.49$, $p = .17$), gender ($X^2(14, N = 546) = 7.71$, $p = .90$) or education ($X^2(21, N = 546) = 15.30$, $p = .81$).

After seeing the one cue design, consumers rated perceived credibility using a 3-item, semantic differential scale. Accurateness, authenticity, and believability of the presented green information were evaluated on a 7-point scale ($\alpha = .93$; Ganz & Grimes, 2018; Tucker et al., 2012).

Figure 4. Study 2 stimuli showing the low naturalness product.

Then, perceived sustainability of the packaging was assessed using the same item as in Study 1. After adding the second cue, consumers revaluated perceived credibility, sustainability, and rated their overall attitudes about the packaged product. Using Chang and colleagues' (2011) scale, consumers rated how bad/good, unfavorable/favorable, and negative/positive their overall attitudes about the packaged product were on a 7-point bipolar scale (α = .97). Purchasing frequency and product liking were included as covariates. The study concluded with manipulation check questions and demographic measures. Additional to Study 1 manipulation checks, another about perceived naturalness was added. Specifically, consumers evaluated how close the packaged product was to nature experiences (e.g. "This packaged product makes me feel close to nature"). Three items were evaluated on a 7-point Likert scale (α = .94; Hartmann & Apaolaza-Ibáñez, 2012).

7.1. Data analysis

The moderation effect of product naturalness was tested by including it as a two-level moderator in the H4a and b analysis, contingent on a successful manipulation check. Relevant pairwise comparisons were then compared between the high and low product naturalness samples. In H6, perceived credibility and perceived sustainability were the predictors in a regression model in which the outcome were consumer attitudes about the packaged product. To assure that consumer attitudes were not influenced by their general liking or frequency of purchase of the products used as stimuli, these variables were added as covariates to the model.

7.2. Manipulation checks

Manipulation checks were successful. Most consumers correctly indicated who the issuer of the source cue was ($X^2(1, N = 546) = 221.06$, $p < .001$) and perceived high specificity claims as more detailed ($M = 4.55$, $SD = 1.38$) than low specificity claims ($M = 4.12$, $SD = 1.59$, $t(536.98) = 3.40$, $p < .001$). Consumers also reported higher nature experience evaluating mushrooms ($M = 10.37$, $SD = 4.70$) than cookies ($M = 9.47$, $SD = 4.91$, $t(536.98) = 2.21$, $p = .03$). For simplification purposes, mushrooms will be referred to as the "high naturalness' product and cookies as the "low naturalness' product throughout the rest of the paper.

7.3. Moderating effects of product naturalness

Although the obtained patterns of results differed between high and low product naturalness subsamples, we found no support for the H5 moderation effect. In the high product naturalness (i.e. mushroom) subsample, Study 1 results were replicated. Namely, adding a high credibility source cue contributed significantly more to evaluations of green information's credibility when paired with a low versus a high credibility claim ($\Delta M = 1.78$, $p = .02$, 95% CI [.23, 3.32]), green lines in Figure 5b. The same comparison was insignificant in the low product naturalness (i.e. cookie) subsample. Furthermore, another significant difference between the low and high product naturalness subsample was found. In low product naturalness subsample, adding a low credibility source cue increased evaluations significantly more when paired with a low versus a high specificity claim ($\Delta M = 1.08$, $p = .03$, 95% CI [.09, 2.07], red lines in Figure 5d). The remaining results were alike between high and low product naturalness subsample, although perceived credibility was generally less positively evaluated in the low versus high product naturalness subsample and when claims were the first presented cue (see Figure 5). This trend was evident regardless of cue content. Notably, similar results were obtained when product naturalness (i.e. manipulation check question) was the specified moderator using a median-split approach (Iacobucci et al., 2015).

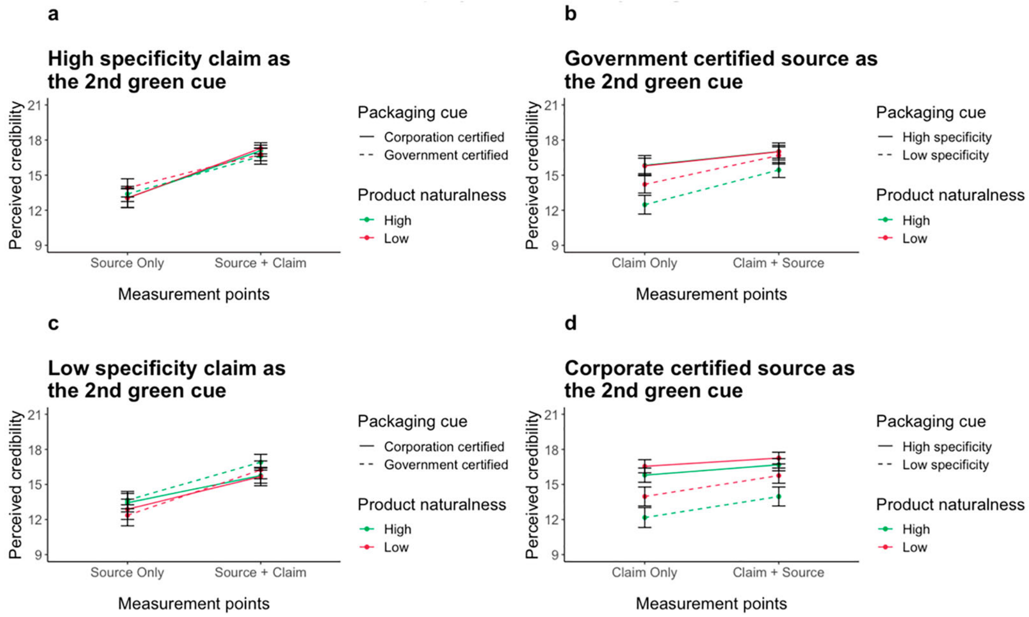

Figure 5. The moderating role of product naturalness in the effect of second cue addition on green information's perceived credibility.

7.4. Consumers' attitudes about green packaged products

Supporting H6, consumer attitudes about packaged products were significantly and positively influenced by both perceived credibility ($\beta = .32$, $t = 6.67$, $p < .001$) and sustainability ($\beta = 1.36$, $t = 10.45$, $p < .001$), explaining a considerable portion of the variance ($R^2 = .57$, $F(4, 541) = 184.1$, $p < .001$).

8. Study 2 discussion

Study 2 replicated Study 1 findings showing support for the "quality over quantity" argument in the high naturalness subsample. Notably, this reasoning only held when the first piece of processed information was claims. We attribute this finding to differences in informational utility between source and claim cues. While high specificity claims were as effective on their own in communicating credibility and sustainability as they were in combination with source cues, government certified source cues were not. This is because source cues generally provide more ambiguous information than claims (Sundar & Kellaris, 2017), likely carrying less informational utility for consumers. Source cues are therefore more dependent on other green information, even if consumers consider them credible, as evident from our results.

Contrary to our expectations, consumers processed information more peripherally on less natural products. This unexpected finding might have occurred because product naturalness increased the salience of sustainability in consumers' minds, making them deliberately focus on the content of green information. Consequently, consumers were better able to detect nuances in green communication. This finding may explain why Spack and colleagues (2012) found that weak and strong arguments comparably influenced consumer purchasing intentions – because the product used as stimuli (i.e. detergent) is typically not regarded as natural. Hence, the product the green arguments were presented on did not facilitate more deliberate information processing.

Consumers were also generally more positive about green information when presented on more natural products. Earlier work demonstrated that consumers infer less ad deceptiveness and consequently evaluate products more favorably when packaging sustainability improvements are communicated on products whose sustainability ratings are high (Steenis et al., 2023). Whereas this research used explicit ratings to signal products' sustainability, we show that consumers make similar inferences themselves: evaluating the same packaging information more positively when they perceive the accompanying product as more natural.

Finally, high perceived credibility and sustainability of the packaging improved attitudes about the packaged product. Hence, credible green communication appears beneficial for the overall image of the products beyond the established route via perceived sustainability (e.g. Steenis et al., 2023).

9. General discussion

The rising demand for sustainable consumption highlights the importance of better understanding how consumers use green information to assess product sustainability. This research extends beyond the well-established knowledge that independently used credible cues improve consumer evaluations of packaged products (e.g. Darnall et al., 2018; Jäger & Weber, 2020) to delve into the intricacies of cue interplay. We found that cues appealing to different information processing routes interact in a complimentary fashion, supporting the theoretical considerations of ELM (Petty & Cacioppo, 1986). However, the degree of benefit from co-presenting the cues largely depends on perceived credibility of the first processed cue, in line with the "quality over quantity" argument. Within this process, consumers assign more relative weight to centrally processed (i.e. claim) cues than peripherally processed (i.e. source) cues. Indeed, claims contributed more to consumer evaluations, both when independently and co-presented. Nevertheless, involving more rather than fewer cues improved consumer evaluations, irrespective of their credibility. Hence, while consumers generally express lower evaluations of a company's credibility in response to being explicitly informed that the claims they saw were fabricated (Keilmann & Koch, 2023), in practical scenarios, they seem to be less adept at distinguishing and penalizing communication efforts that are inherently less credible. Finally, the influence of packaging cues should not be considered in isolation, as consumers tend to make judgments influenced by both aspects, even when product cues are not explicitly emphasized. Therefore, beyond the format of green packaging information, the means on which this information is delivered is also relevant.

9.1. Theoretical implications

Our research adds to the literature on how green on-package communication affects consumer evaluations (e.g. Schmuck et al., 2018; Steenis et al., 2017). We found perceived credibility of green information to be an important mechanism explaining how green packaging cues exert an effect on consequent judgments about packaged products. We shed additional light on the nature of the cue interaction, whereby a notable caveat lays in the confirmed "quality over quantity" argument. Specifically, the added weight of the second piece of green information depends on the first processed green cue. Hence, introducing additional green cues to an initially highly credible piece of green information minimally improves overall perceived credibility and sustainability evaluations. The need for additional information search potentially explains these findings, as consumers feel less inclined to search, and by proxy process, additional green information when the first cue is perceived as sufficiently credible. Nevertheless, the quantity of cues also matters as consumers' overall evaluations are more positive when more, rather than less cues are presented.

This study also extends the current knowledge on how product inferences influence evaluations of green packaging information (e.g. Anghelcev et al., 2020; Magnier et al., 2016; Van Doorn & Verhoef, 2011). We demonstrate that green packaging information is evaluated more positively and processed more centrally when presented on products that are perceived as natural. Therefore, we deduce that the relatedness between mental schemas of product naturalness and packaging sustainability (Tobler et al., 2011) inadvertently reinforces positive responses towards green packaging information in a manner that is independent of the information's content. Furthermore, co-activating the naturalness concept with that of sustainability might work as a reminder for consumers to *carefully* inspect green information. This suggests that product naturalness also seems to motivate consumers to process green information more centrally.

9.2. Practical implications

Our research shows that strategic presentation of green communication can counter low credibility information. Specifically, co-presenting green cues enhances sustainability evaluations, mostly if these cues themselves lack credibility. Consequently, companies employing vague or misleading green information may not face substantial negative consequences, as they do not significantly lower consumer evaluations. This provides a strategic advantage for companies seeking to bolster their sustainability image. Additionally, consumers tend to process green information less critically when it is presented on products perceived as having lower naturalness, offering companies another opportunity to mask deficiencies in their green communication efforts. These findings suggest that in markets where less credible green communication strategies are prevalent and consumer perception is the primary driver, genuinely transparent and credible green communication strategies will likely not enjoy a competitive "sustainability" advantage. They also underscore the importance of regulatory measures by governments and policymakers to safeguard consumers against potential misinformation.

There are also implications for green marketeers wishing to increase consumer value of green communications. Claim, rather than source cues, have a stronger influence on credibility, sustainability, and attitude evaluations. Marketeers should therefore capitalize on claims' positive impact by using them to communicate sustainability in a specific and honest manner. However, claims are more cognitively demanding to process and as such, consumers often overlook them (Fogg & Hsiang, 1999). Marketeers should assure claim visibility to increase the chances of claims being processed first. This can be achieved by using larger fonts or placing the claims centrally on the label, for example. Especially in assortments, marketers should consider the product they display green information on, as it is better received on items perceived as natural. Therefore, natural, or minimally processed foods will likely be more suitable to present green information on.

9.3. Study limitations and future directions

Our research has limitations, as both studies were conducted online. Real-world consumer responses may differ, especially if packaged products were to be presented in assortments whereby consumers could directly compare various formats of green information.

Because of the significance of perceived credibility in consumer sustainability evaluations, future research could explore how different packaging cues, such as typography, imagery, and materials, influence credibility assessments. Their presence (or absence) might work as a positive (or negative) credibility reinforcer. Furthermore, to best gauge the impact of sustainable labelling on consumer choices, future studies should consider moving beyond using consumer attitudes as a proxy for consumer behaviors. Finally, exploring how consumer traits, such as environmental consciousness, impact green packaging information processing is relevant, as environmentally conscious consumers might scrutinize green packaging information more than others (Ahmed et al., 2021).

9.4. Conclusions

Communicating product greenness is challenging, considering that most consumers are interested in green products, but somewhat skeptical of the benefits claimed via the labeling. We explored consumers' reactions to green source and claim cue interplay, simultaneously assessing the role of cue order, and product naturalness. Our results suggest that even though cues interact in a complementary manner, the added weight of the second added cue is contingent on the first processed cue's perceived credibility. Moreover, green information is more positively and more centrally evaluated on products perceived as more natural. Taken together, consumers valued green communication using credible cues on packaged foods but they also: (1) appreciated higher cue quantity, (2) did not penalize communications using low credibility cues, and (3) evaluated green packaging information swayed by product cues.

Note

1. The same exclusion criteria from Study 1 were used.

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