Environmentally-framed eWOM messages of different valence: The role of environmental concerns, moral norms, and product environmental impact

Abstract

Consumers are increasingly interested to know about the environmental impact of products and, at the same time, they form attitudes after reading online consumer reviews (OCRs). Drawing on negativity bias, schema congruity theory, and norm-activation model, we investigate the effects of OCRs carrying environmental messages of different valence, on perceived review usefulness, product attitude and purchase intention in products with low versus high environmental impact. Two factorial experiments (positive versus negative reviews; low versus high environmental impact) were conducted respectively with a sample of 321 Italian and 250 French consumers. The findings of the two studies show a partial support of the moderating role of product environmental impact, suggesting that products perceived to have a high impact on the environment strengthen the impact of a positive and negative review carrying environmental messages. The effect of a positive and a negative review is contingent upon the level of consumers’ environmental concern. Negative reviews of high impact products are more impactful in contexts in which environmental concerns are high, while positive reviews are more significant when environmental concerns are low. The perceived usefulness of a negative review about high impact products influences attitude and purchase intention negatively when moral norms are high.

Keywords: eWOM; online consumer reviews; review valence; product environmental impact; review usefulness; product attitude; purchase intentions.
1. Introduction

The growing environmental concerns among consumers around the globe has spurred the demand for greener products (Andreu, Casado-Díaz, & Mattila, 2015; Schmuck et al., 2018). Consumers, especially Millennials, are more wary of firm’s corporate social responsibility, as the environment is one of the values that Millennials care about the most (Coughlin, 2018). While the impact of green products and green marketing on consumer responses has been widely investigated (e.g. Mohr, Webb, & Harris, 2001; Becker-Olsen, Cudmore, & Hill, 2006; Borin, Cerf, & Krishnan, 2011; Kong & Zhang, 2014; Ottman, 2017), consumers’ perceptions and reaction to environmentally-framed online content generated by consumers (i.e., eWOM), has been largely understudied.

Impression formation and social psychology research documented a negativity bias in individuals’ information processing, which is the tendency to consider negative information as more salient, impactful, and interesting than positive information (Amabile, 1983; Skowronski & Carlston, 1989; Peeters & Czapinski, 1990; Rozin & Royzman, 2001). Researchers studying eWOM have revealed that negative online consumer reviews (OCR) and ratings are perceived as more useful (Casaló et al., 2015; Filieri, Raguseo, & Vitari, 2019), have a stronger impact on readers’ attitude towards products (Sen & Lerman, 2007), and have a higher impact on product sales, than positive reviews (Basuoy et al., 2003; Chevalier & Mayzlin, 2006). However, contrasting results have also been produced in different studies about the role of positive and negative reviews on review helpfulness, consumer attitude and behaviour (Zhang, Craciun, & Shin, 2010; Mudambi & Schuff, 2010; Wu, 2013; Gershoff, Mukherjee, & Mukhopadhyay, 2013; Lin & Xu, 2017). To explain these contrasting results, scholars have investigated the moderating role of product type in the relationship between review valence and behavioural outcomes (e.g. Sen & Lerman, 2007;

These studies proved that product type moderates the influence of both positively as well as negatively valenced reviews (e.g. Mudambi & Schuff, 2010; Cui et al., 2011; Filieri, Galati, & Raguseo, 2020).

Although research on various product types has been conducted (e.g. Purnawirawan et al., 2015), no study has investigated whether online messages that are framed in OCRs as positive or negative in terms of products’ environmental impact produce the same effects for products with a different impact on the environment. This is surprising considering that OCRs, a typology of electronic word-of-mouth (eWOM), affect the purchase decision of consumers of different ages and gender (Murphy, 2019). OCRs are also considered as particularly useful to learn more, and to form opinions about products, people, services and brands offered by a company (Zhang, Craciun, & Shin, 2010; Filieri, 2015). The importance of consumers’ feedback about the environmentally-friendly properties of products can be particularly relevant, since eWOM is one of the most trusted communications about brands (Bickart & Schindler, 2001; Filieri, 2016; Murphy, 2019) and most consumers do not trust green marketing communications, which are often perceived as greenwashing (Parguel, Benoit-Moreau, & Larceneux, 2011). The lack of transparency of marketing communications impede most consumers to identify green products because many environmental claims relating to green attributes are ambiguous or deceptive (Pickett-Baker & Ozaki, 2008; Chen & Chang, 2013). Furthermore, research on environmental discourse in OCRs has pointed out that the consumers’ discussion of products’ Corporate Social Responsibility (CSR) aspects is growing in eWOM settings (D’Acunto et al., 2019). Some organizations, like Positively Sustainable, already provide a sustainability rating scale in
reviewing the environmental and social impact of products. Considering how rapidly eWOM, and particularly negative eWOM, spreads online (Hornik et al., 2015), and their effect on a company’s reputation and sales (Basuroy, Chatterjee, & Ravid, 2003), it is paramount for managers to monitor consumers’ eWOM communications regarding the environmental impact of products.

To fill this relevant research gap, we conducted two experimental studies. In the first study, we draw upon schema-congruity theory (Mandler, 1981), and we argue that the influence of negatively and positively-framed reviews of products with different impacts on the environment on perceived review usefulness, product attitude, and purchase intention varies depending on schema incongruent information from consumer reviews about the products’ perceived environmental impact. In the second study, we test whether the impact of negative review valence is moderated by the activation of personal moral norms (Schwartz, 1977), focusing on a different context where there is a long tradition of environmental regulations and consumers’ environmental concerns (Grankvist, Dahlstrand, & Biel, 2004) are high. In doing so, we advance the eWOM valence literature by investigating whether the environmental impact of products (i.e. harmful versus non-harmful products) and moral norms moderate the influence of positive and negative OCRs carrying environmentally-framed messages, on review usefulness, product attitude, and purchase intention.

2. Literature review and theoretical foundations

2.1 eWOM communication and negativity bias

Hennig-Thurau et al. (2004, p.39) defines eWOM as ‘any positive or negative statement made by potential, actual, or former customers about a product or company, which is made
available to a multitude of people and institutions via the Internet’. The focus of this paper is on online customer reviews (OCRs), a particular form of eWOM, which is defined as any feedback on a product, service, person, or brand shared online (i.e. online communities, third-party retailers, social media) by a former customer or from someone who acts as if he/she has been a customer in order to get a reward or a compensation (Filieri, 2016). One of the most researched topics in the eWOM literature is review valence, which is the evaluative tone of a review varying from very positive to very negative (Wu, 2013; Purnawirawan et al., 2015), passing from positive, negative, and neutral evaluations.

Several studies have analyzed the eWOM valence and its impact on business performance and consumer behaviour. For instance, scholars investigated the impact of review valence on sales (e.g. Godes & Mayzlin, 2004; Chevalier & Mayzlin, 2006), business performance (Raguseo & Vitari, 2017), message persuasiveness (Park et al., 2007; Park & Lee, 2008; Lee et al., 2008; Zhang, Craciun, & Shin, 2010; Lee & Koo, 2012; Tsao et al., 2015; Kostyra et al., 2016), purchase intention (Filieri, 2016; Ketron, 2017), and review helpfulness (e.g. Mudambi & Schuff, 2010; Pan & Zhang, 2011; Park & Nicolau, 2015; Filieri, 2015; Agnihotri & Bhattacharya, 2016; Filieri et al., 2019).

In the WOM literature, negativity bias translates in a person’s tendency to evaluate negative information as more salient than positive information. Negative and extremely negative information are considered to be more diagnostic than positive information (Mizerski, 1982; Amabile, 1983; Herr, Kardes, & Kim, 1991), that is, they are more useful to consumers to evaluate the quality of products (Fiske, 1980). The negativity bias in consumers’ information processing has been studied in prior research, also in the eWOM context (Sen & Lerman, 2007; Park & Lee, 2009; Lee & Koo, 2012; Wu, 2013; Purnawirawan et al., 2015; Casaló et al., 2015; Filieri et al., 2019). Although the majority of consumer reviews on review websites
are positive, negative reviews seem to have a higher impact on consumer attitudes (Purnawirawan et al., 2015) and product sales (Basuoy et al., 2003; Chevalier & Mayzlin, 2006). Negative reviews are also perceived to be more diagnostic to evaluate products and more trustworthy than positive reviews (Filieri, 2016).

However, some contrasting results exist (Wu, 2013; Gershoff, Mukherjee, & Mukhopadhyay, 2013; Tsao et al., 2015). For instance, Wu (2013) use experiments to demonstrate that negative reviews are not necessarily more helpful than positive reviews while the amount and quality of information contained in a review are critical for determining the perceived helpfulness of the review. The literature shows that both positive and negative reviews have an impact on consumer behaviour under specific conditions (Zhang, Craciun, & Shin, 2010), that is, some factors can moderate the influence of both positive and negative reviews and ratings (Mudambi & Schuff, 2010). Hence, scholars call for more research on the moderating factors of review valence’s influence on consumer behaviour to better explain the contrasting results obtained in previous studies (Filieri et al., 2019). One of these moderating factors is product type, which will be discussed in the next section.

2.4 eWOM Valence and Product Type

Product type is important in understanding the influence of review valence on consumer attitudes and behaviour (Sen & Lerman, 2007; Park & Lee, 2009; Zhu & Zhang, 2010; Mudambi & Schuff, 2010; Pan & Chiou, 2011; Lee & Shin, 2014; Purnawirawan et al., 2015). Research has investigated the influence of online reviews valence for different types of products such as: experience versus search (e.g. Park & Lee, 2009; Ketron, 2017);
experience versus credence (Pan & Chiou, 2011); hedonic versus utilitarian (e.g. Sen & Lerman, 2007); and more popular versus less popular products (Zhu & Zhang, 2010).

By comparing utilitarian and hedonic products, Sen and Lerman (2007) proved that product type moderates the effectiveness of eWOM valence on the attitude towards the review, observing a negativity bias only in readers of utilitarian products reviews and not for hedonic products reviews. They also found that the type of product magnifies the impact of valence on product attitude, such that negative and positive reviews of utilitarian products lead respectively to higher (versus lower) attitude than negative (versus positive) reviews of hedonic products. Their findings also reveal that negative reviews for hedonic products are less likely to be perceived as helpful compared to negative reviews of utilitarian products (Sen & Lerman, 2007). Conversely, Lee and Shin (2014) showed that high-quality positive reviews have a positive influence on product attitude and purchase intentions despite the type of product (search versus experience). However, low-quality positive reviews lead to a more negative evaluation of the product and a lower purchase intention for experience goods only, but no corresponding effect was found for search goods. Furthermore, Pan and Chiou (2011) observed that negative information – as opposed to positive - is more trustworthy for experience goods than credence goods. Yet, positive information positively affects consumer’s product attitude, regardless of the type of product.

Concerning the moderating role of product type in the relationship between review valence and review helpfulness, scholars also found mixed results. For experience goods (i.e. PC video game, music CD, and MP3 player), the findings of two studies indicate that product type moderates the influence of review extremity on the helpfulness of the review, and for this product type, extreme reviews are less helpful than moderate ratings reviews (Mudambi & Schuff, 2010; Cao, Duan, & Gan, 2011). However, Park and Lee (2009) reveal that
negative OCRs influence readers more than positive OCRs, both for experience and search goods; consumers also exhibit a stronger negativity bias for experience than for search goods. Purnawirawan et al. (2015) reveal that review valence has a stronger influence on perceived usefulness for experience rather than search products, because the assessment of experience products involves a more subjective experience, while consumers can assess search products’ characteristics objectively. Finally, Zhu and Zhang (2010)’s results indicate that online reviews are more influential for less popular games and for the games whose players have greater experience.

2.2 Low versus High Environmental Impact Product

In light of this literature review, it is evident that no research has been conducted on consumer-generated content carrying environmental messages about products with different levels of environmental impact. Specifically, no study has examined the potential moderating role of products with different perceived impacts on the environment (i.e. high versus low impact) and their role in the relationship between environmentally-framed positive and negative reviews and consumer attitude and behaviour.

Previous advertising literature addressed the effects of different types of brand’s environmental claims on consumers’ purchase intention of green products with mixed results (e.g. Phau & Ong, 2007; Tucker et al., 2012; Schmuck et al., 2018). However, defining what constitutes a “green” product is a complex task, because terms such as “recyclable”, “eco-friendly”, “sustainable”, “environmentally-safe” are ambiguous and often create cynicism among consumers (Baumann et al., 2002; Borin et al., 2011). Products are generally termed as environmentally-friendly if they a) are produced without non-toxic chemicals with low
detrimental environmental impact at all stages of their life-cycle or b) are recyclable, reusable, bio-degradable, or c) have eco-friendly packaging (OECD, 2009; Biswas & Roy, 2015). However, Cooper (2000) noted that all products implicate some negative impacts on the environment at some stage in their lifecycle, and introduced the ‘eco-performance continuum’, which indicates the level of environmental damage of products (Kong & Zhang, 2014). According to this view, that has been prominent in industrial ecology since 1970s (Cooper, 2005), products can be classified based on their impact on the environment substituting the deceptive green versus non-green dichotomy (Cooper, 2005). More specifically, products’ environmental impact would relate to whether or not the manufacturing process involves, for example, the use of non-renewable resources or toxic materials. Following this reasoning, with environmentally-framed reviews of different valence we refer to consumer reviews containing information about the product’s environmental performance.

Research on products’ environmental impact (low versus high) and consumer behaviour is somewhat scarce. Follows and Jobber (2000), who developed a model to explain environmentally responsible purchase behaviour, reveal that consumers form different attitudes towards responsible and non-responsible product alternatives, which in turn mediate purchase intention. Borin et al. (2011) reveal that if green products highlight the reasons why products free of harmful ingredients do not have a negative impact on the environment, they would benefit over harmful products. In advertising research, Kong and Zhang (2014) provided a good understanding of the interaction between the type of appeal in advertising (green versus non-green appeal) and product type (low versus high impact on the environment). Their experiment revealed that ads with a green appeal (green marketing) have a stronger effect on purchase intentions for products with high impact on the environment,
while for products with low impact this difference was not significant. Schmuck et al. (2018) use experiment to assess the influence of different types of advertisements (non-green advert, a functional green ad promoting product’s environmental attributes, and a combined nature ad featuring a pleasant nature image in addition to functional attributes) on brand attitude and purchase intention. Their findings reveal that although functional green advertisements enhance perceptions of brand’s environmental benefits, which positively affect purchase intention partially mediated by brand attitudes, advertisements combining both emotional and functional aspects affect brand attitudes and purchase intention beyond perceptions of brand’s environmental benefits even in high involvement conditions.

From the review of this literature it is evident that existing studies focus on traditional brand–initiated communications (advertising) including environmentally-framed advertisements or slogans. Hence, no study has to date focused on the influence of consumer-initiated communications (i.e. online consumer reviews) of difference valence (i.e. positive versus negative) stressing the environmental impact of a product.

3. Hypotheses development

3.1 Review valence and review usefulness

The negativity bias concept suggests that negative information is more diagnostic, attention-catching, and helpful than positive information (Herr et al., 1991; Rozin & Royzman, 2001), which has received empirical confirmation in eWOM settings (Casaló et al., 2015). In this study, we argue that negativity bias depends on the cognitive dissonance generated by information on products with different perceived environmental impact. The schema-congruity theory (Mandler, 1981) state that information perceived as congruent to mental
schema (i.e. previous beliefs) create familiarity and generate limited cognitive processing, whereas schema incongruent information generate surprise and triggers extensive cognitive processing to make sense of the unusual situation or information. Drawing on schema congruity theory, we expect that a positive review (i.e. a review containing positive information about the product’s environmental impact) about a product that is perceived as harmful to the environment and a negative review (i.e. a review containing negative information about the product’s environmental impact) about a product that is perceived as less harmful to the environment will create discrepancy with mental schema (Mandler, 1981). Hence, the first type of consumer reviews will be perceived as more interesting and unexpected than a positive review of a product that is perceived as less harmful, or a negative review of a product that is perceived as harmful for the environment. The former types of reviews will thus generate more cognitive processing as they are incongruent with common beliefs and, thus, create discrepancy in the reader (Festinger, 1962; Mandler, 1981).

Environmental groups, activists and general consumers often spread negative word-of-mouth on social media about companies that are not respectful towards the environment (Park and Yang, 2012). Accordingly, consumers are more frequently exposed to negative opinions of products that are generally perceived as dangerous for the environment; hence these reviews will be more expected and judged as less useful because they simply confirm prior beliefs without adding new knowledge to consumers. Hence, we hypothesize as follows:

**H1:** Product type moderates the effect of review valence on review usefulness such that:

a) a positive review of a product with a high (vs. low) perceived environmental impact will be perceived as more useful.

b) Conversely, a negative review of a product with a low (vs. high) environmental impact will be perceived as more useful.
3.2 Review valence, product type, and product attitude

eWOM research shows that OCRs, especially when positive, have positive effects on consumers’ attitude towards different products, such as tourism destinations (Jalilvand et al., 2012), accommodation (Mauri & Minazzi, 2013), as well as notebooks and shampoo (Wu and Wang, 2011). From the mid-1990s, consumers started to become more environmentally and socially-aware, which change in consumer attitude has fostered the growth of environmental and social marketing (Strong, 1996). Research on advertisements suggests that consumers develop positive attitudes towards companies that implement green brand positioning strategies (Hartmann, Apaolaza Ibáñez, & Forcada Sainz, 2005). A brand that is positioned as green fits well with environmentally-conscious consumers’ values because it improves the quality of the environment in which they live and provides some personal, functional and emotional benefits, which they cannot obtain with other products (Hartmann et al., 2005). For instance, the nutritional and health benefits of food claims have shown to improve consumers’ product attitudes (Kozup, Creyer, & Burton, 2003). Olsen, Slotegraaf, & Chandukala (2014) found that green new product introductions can improve brand attitude and that the quantity of green messages, product type, and source credibility influence the extent to which green new products change brand attitude.

Drawing on these studies and schema congruity theory (Mandler, 1981), we argue that a positively valenced consumer review discussing the environmental benefits of a product that is generally perceived as more harmful to the environment will have a higher effect on product attitude than a positive review of a product that is perceived as less harmful to the environment. Accordingly, consumers will be positively surprised to read favourable information about a product that is generally considered as harmful for the environment.
Hence, we expect that positive reviews of products with high – as opposed with low - perceived environmental impact will lead to a more positive product attitude. Conversely, negative reviews of products generally perceived as having a low environmental impact will have a stronger impact on product attitude compared to negative reviews of products perceived as harmful to the environment. The former reviews will create an unpleasant stimulus because of the discrepancy with otherwise positive beliefs, which will require higher information processing, and will lead to a negative attitude towards such products. Hence:

**H2: Product type moderates the effect of review valence on product attitude such that:**

a) **Positive reviews of products with high (vs. low) perceived environmental impact will lead to a more positive product attitude.**

b) **Negative reviews of products with low (vs. high) perceived environmental impact will lead to a more negative product attitude.**

### 3.3 Product perceived environmental impact, review valence, and purchase intention

Research demonstrated the influence of review valence on consumers’ purchase intention and preferences (Park et al., 2007; Lee et al., 2008; Park & Lee, 2008; Lee & Koo, 2012; Mauri & Minazzi, 2013; Lee & Shin, 2014; Purnawirawan et al., 2015; Tsao et al., 2015; Filieri, 2016; Kostyra et al., 2016; Ketron, 2017; Lin & Xu, 2017).

Based on schema congruity theory (Mandler & Parker, 1976), the impact of the stimulus-based schema (i.e. online consumer reviews) on behaviour will be higher depending on the degree of incongruity with mental-based schema; that is, negative reviews of products perceived as not harmful to the environment will be more impactful on consumer intention than negative reviews of products generally perceived as harmful to the environment. That is,
the discrepancy of the new information (stimulus-based schema) with brain-based schema about the environmental impact of products provided in the consumer review leads to changes in attitude and behaviour (Brehm & Cohen, 1962).

Based on the above arguments, we argue that consumers will be more likely to buy products generally perceived as more harmful to the environment when a reviewer discusses its positive environmentally-friendly properties compared to positive reviews of products generally perceived as less harmful to the environment. Conversely, consumers will be less likely to purchase low-impact products after reading a negative review about them compared to negative reviews of product generally considered as harmful for the environment. Thus, we hypothesize:

**H3: Product type moderates the effect of review valence on purchase intention such that:**

a) **Positive reviews of products with high (vs. low) perceived environmental impact will lead to a greater purchase intention.**

b) **Negative reviews of products with low (vs. high) perceived environmental impact will lead to lower purchase intentions.**

4. Methodology

4.1 Research design and product selection

This experimental study adopted a 2 (positive *versus* negative review) x 2 (low *versus* high perceived environmental impact of a product) full factorial between-subject design. To develop the appropriate stimuli, we conducted a series of pre-tests in order to a) identify the products to be used in the main experiment and b) test the stimuli to ensure the believability
of all reviews to be used in the main experiment and the correct manipulation of message framing. Although all products somehow produce negative impacts on the environment (Cooper, 2000), consumers perceive some products to have higher environmental impact while others are associated with lower environmental impact (Kong & Zhang, 2014). For the identification of the two products (high versus low environmental impact products), the possible alternatives were first narrowed down to eight product categories: conventional cleaning products, air fresheners, light bulbs, batteries, cereals, office paper, canned vegetables and cotton t-shirts. Selection criteria were primarily aimed to ensure that all products would have elicited similar levels of involvement and meanings. Indeed, the focus was limited to fast-moving experience goods with low consumer involvement and no explicit hedonic meaning attached to it.

A pre-test was administered online to a convenient sample of 43 participants (see Table 1), asking to what extent they perceived the eight product categories to be harmful to the environment based on a 7-point scale from “Not at all harmful” to “Very harmful”, consistently with a prior experiment (Kong & Zhang, 2014). Each product appeared to the participant together with a generic unbranded image of the product and in random order. As shown in Table 1, the battery product category was perceived to be the most harmful to the environment (M = 5.72, SD = 1.16), whereas cereals were perceived to be the least harmful (M = 1.93, SD = 1.42). Thus, batteries and cereals were chosen to be used in the main experiment.

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4.2 Stimulus selection
The stimulus consisted of a picture exhibiting a product along with the customer review in the context of a recognizable e-commerce website (i.e. Amazon). The stimulus was created starting from real Amazon reviews reporting environmental information about the products selected in pre-test 1. The information collected was adapted to create reviews with equal level of message framing and length. The main goal was to obtain a stimulus which would have clearly emphasised the environmental aspects of the reviewed product without neglecting the product-related information like quality and performance since consumers are unlikely to base their decisions only on the environmental characteristics of the product (Davis, 1993). However, the objective was to make the reader perceive the environmental information as the predominant factor determining the message framing and the product-related information as more peripheral. Thus, we went through several iterations until the right stimulus was developed. Product rating indicators were also included (i.e. star rating) to guarantee the appropriate manipulation of review valence. To avoid the confounding effects of brand name, fictitious brand names were assigned to the products (“Powerloop” for batteries and “CerealFarm” for cereals). In this way, the reader is prevented from recalling familiar brands, which could have been a potential distortion in the treatment.

4.3 Manipulation checks

A further pre-test was administered through an online questionnaire to a convenience sample of 34 people, which were randomly split into two complementary groups: Group 1 showing a positive review of batteries and a negative review of cereals and Group 2 the other way around. The two reviews appeared in random order to each group. Subjects were asked to what extent they felt the review was negative or positive (i.e. valence) and how likely they expect to find such a consumer review online (i.e. review believability). Scores were measured using two 7-point semantic differential scales (Very negative/Very positive and
Very Unlikely/Very likely). We ran ANOVA to check whether subjects perceived the valence between the reviews with the same message framing (positive / negative) to be significantly different. The two positive reviews were not significantly different in terms of perceived review valence ($F(32) = .057, p = .813$). Equally, the review valence of two types of negative reviews was not significantly different ($F(32) = 1.588, p = .217$). The stimuli design in terms of review valence was therefore successful in that we created similarly positive reviews and similarly negative reviews.

We also checked for the believability of each stimulus. Although the mean scores of all the reviews were on the positive side of the scale, negative reviews ($M = 4.18, SD = 1.57$) were perceived as less believable than positive reviews ($M = 5.09, SD = 1.52$), especially for cereals ($M = 3.95, SD = 1.81$). Based on these results, consumer reviews were further improved in order to create appropriate stimuli and an additional test was conducted to investigate the perceived review valence and believability. The online survey was administered through Qualtrics to a convenience sample of 36 people and each subject was randomly assigned to one of the four possible treatments conditions and then asked to report about the review valence and believability. The ANOVA revealed that the difference between positive reviews ($M = 5.33, SD = 1.85$) and negative reviews ($M = 2.67, SD = 1.50$) was significant ($F = 22.667, p < .001$), confirming a successful manipulation check for review valence. Furthermore, ANOVA also showed no significant difference in the perceived believability between the four reviews ($F = .236 [3, 32], p = .870$), demonstrating that all the reviews were perceived by subjects as adequately believable. Results of the pre-tests along with the dependent measures to be adopted in the main experiment were presented for validation to two academic experts in experimental studies. Based on their advice, adjustments to the reviews were made to correct the issues detected by prior pre-tests. Figure
2 shows the four final stimuli used in the main experiment and Appendix 1 illustrates the English translation.

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4.4 Sample

Convenience sampling, a non-probability sampling technique extensively used in experimental designs (Park and Lee, 2009; Sen and Lerman, 2007; Kong and Zhang, 2014), was chosen as sampling technique. The invitation to take part in the study was distributed on social media to people in the social network of the researchers of this study. As the language of the developed stimuli was Italian, the target population of this study was limited to adult Italian consumers who bought or browsed products online in the three months prior to the experiment. The planned sample size should exceed the recommended size of 50 subjects for each independent group in factorial experiment. In a period of two weeks, 322 participants took part in the study; however 21 questionnaires were excluded as non-complete. The demographic composition the sample can be observed in Table 2.

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4.5 Procedure

Screening questions asked respondents about their nationality, age, and their use of OCRs in the last 3 months. Before being exposed to the stimuli, participants were asked to picture a situation in which they were looking for information online about a product they needed to buy and had narrowed down to the possible alternatives. It was not specified whether the purchase would occur online or offline to improve internal validity (Sen & Lerman, 2007), since it was important that subjects clearly felt they had alternatives to the product mentioned.
in the review. Participants were then asked to read carefully the review and answer to the questions related to the constructs of this study.

4.6 Measures

The stimuli and questionnaire were translated from English to Italian using the backward translation technique (see Appendix 1). The questionnaire included two manipulation checks to verify that the manipulation of the independent variables was successful. To measure the perceived environmental impact of products, participants were asked if they perceived the product mentioned in the review to be harmful to the environment on a 9-point semantic differential scale from “Not at all harmful” to “Very harmful”. For review valence, subjects were asked the extent to which they felt that the review of the product was negative or positive based on a 9-point semantic differential scale from “Very negative” to “Very positive”. Finally, to establish that the groups did not differ in terms of the overall environmental concern, they were also asked about their general concern for environmental issues (4 items, $\alpha = 0.85$; example item: I am very worried about the consequences of environmental problems on people). The measurement scales and items of the variables used in the main analysis are presented in Appendix 2, while the results of the reliability test are displayed in Appendix 3, which shows that the coefficients are all above the recommended threshold of 0.7 (Fornell & Larcker, 1981). We adopted Spearman-Brown as recommended for the only 2-items scale in our questionnaire as recommended in literature (Eisinga, Te Grotenhuis, & Pelzer, 2013).

4.7 Manipulation checks

A one-way ANOVA was conducted to check the manipulation of review valence. Test for homogeneity of variance between positive and negative reviews was not significant ($p > .05)$. 

The ANOVA revealed an overall significant difference in review valence ($F = 127.366, p < .001$) between the positive review ($M = 5.39, SD = 1.40$) and the negative review ($M = 2.61, SD = 1.72$). Also, there was a significant difference in terms of review valence between the negative and the positive review stimuli for the product with high environmental impact ($M_{\text{negative review}} = 2.92, SD = 1.85$, $M_{\text{positive review}} = 5.65, SD = 1.35$ $F = 113.82, p < .001$) and between the negative and the positive review for the low environmental impact product condition ($M_{\text{negative review}} = 2.32, SD = 1.52$, $M_{\text{positive review}} = 5.12, SD = 1.41$; $F = 148.06; p < .001$). Thus, the manipulation of review valence was successful.

An ANOVA was also carried out to verify the manipulation of product type in terms of its environmental impact. The perceived environmental impact of the batteries as a high environmental impact product ($M = 5.57, SD = 1.44$) and cereals as a low environmental impact product ($M = 3.20, SD = 1.75$) was shown to be significantly different between the two product types ($F = 175.57, p < .001$). Thus, the manipulation of product’s perceived environmental impact was successful. Finally, the four experimental groups did not differ in their general environmental concern ($F = .25, p = .86$), therefore they represented comparable conditions in that regard.

5. Results

We first examined the effect of product type (high versus low environmental impact) by conducting MANOVA with product type and review valence as the two independent variables. The two different product types had significant effect on consumer responses (Wilks’ $\lambda$: $F = 6.11; p < .001$; partial $\eta^2 = .054$). The difference between the high and the low environmental impact product types was significant for review usefulness ($M_{\text{LowEnvImpact}} =$
6.19, SD = 1.68; \( M_{\text{High Env Impact}} = 6.86, \ SD = 1.64; \ F = 13.27, \ p < .001; \ \text{partial } \eta^2 = .04 \) and purchase intentions (\( M_{\text{Low Env Impact}} = 4.74, \ SD = 2.27; \ M_{\text{High Env Impact}} = 5.43, \ SD = 2.36; \ F = 7.27, \ p < .01; \ \text{partial } \eta^2 = .02 \)). The attitude towards the product was marginally significant (\( M_{\text{Low Env Impact}} = 4.90, \ SD = 2.03; \ M_{\text{High Env Impact}} = 5.34, \ SD = 2.35; \ F = 3.36, \ p = .07; \ \text{partial } \eta^2 = .01 \)).

Moreover, the direct effects of the two conditions on the three dependent variables were as follows; MANOVA showed that review valence had a significant effect on consumer responses (Wilks' \( \lambda \): \( F = 82.534, \ p < .001, \ \text{partial } \eta^2 = .438 \)), specifically for perceived review usefulness (\( M_{\text{positive rev}} = 6.72, \ SD = 1.56; \ M_{\text{negative rev}} = 6.32, \ SD = 1.80; \ F = .46, \ p < .05; \ \text{partial } \eta^2 = .014 \)), attitude towards the product (\( M_{\text{positive rev}} = 6.52, \ SD = 1.69; \ M_{\text{negative rev}} = 3.69, \ SD = 1.69; \ F = 225.04; \ p < .001; \ \text{partial } \eta^2 = .365 \)), and purchase intention (\( M_{\text{positive rev}} = 6.48, \ SD = 1.74; \ M_{\text{negative rev}} = 3.65, \ SD = 1.99; \ F = 183.594, \ p < .001; \ \text{partial } \eta^2 = .413 \)).

5.1 Moderation effects

In order to test the hypotheses of this study, ANOVA examined the interaction effects of review valence and product environmental impact on consumer responses. H1 predicted that product type moderates the effect of review valence on perceived review usefulness. The interaction effect between review valence and product type on review usefulness was indeed significant (\( F(1,318) = 8.84, \ p < .01 \)). Simple effects test is not directly available in SPSS, therefore command syntax (IBM, 2020) was used to examine the effects across the four conditions. Respondents reported that the positive review of a product with high environmental impact was significantly more useful as opposed to a positive review of a product with low environmental impact (\( M_{\text{High Env Impact}} = 7.32, \ SD = 1.21; \ M_{\text{Low Env Impact}} = 6.12, \ SD = 1.64; \ F(1,318)=22.36, \ p <.001 \)). Review usefulness was not significantly different with regards to negative reviews for the two product types (\( M_{\text{High Env Impact}} = 6.38, \ SD = \)
M_{Low\_Env\_Impact} = 6.26, SD = 1.73; F(1,318) = .24, p = .62). As stipulated in H1a, a positivity bias was expected only for reviews of the products associated with high environmental impact (i.e. batteries). Yet, as exhibited in Figure 3, subjects showed a positivity bias for batteries and no corresponding effect was found for the product with low perceived environmental impact (i.e. cereals). Therefore, H1a was supported while H1b was not supported.

----FIGURE 3 HERE----

H2 predicted an interaction effect between review valence and product environmental impact on attitude towards the product. The results suggested product type (high vs. low environmental impact) moderated the impact of review valence as hypothesized (F(1,318) = 10.428, p < .01). Specifically, participants reported significantly higher product attitude after reading a positive review about a product with high environmental impact as opposed to reading a positive review about a product with low environmental impact (M_{High\_Env\_Impact} = 7.04, SD = 1.59; M_{Low\_Env\_Impact} = 6.00, SD = 1.65; F (1,318) = 15.99, p < .001). In contrast, product attitude did not differ significantly after reading a negative review about the two product types (M_{High\_Env\_Impact} = 3.59, SD = 1.64; M_{Low\_Env\_Impact} = 3.76, SD = 1.78; F(1,318) = .35, p = .56). Therefore, H2a was supported and H2b was not supported.

----FIGURE 4 HERE----

Finally, we examined the effect of review valence on purchase intentions taking into account the moderation of product type (H3a, b). While the interaction effect was not significant, the trend was approaching the hypothesized interaction (F = 2.13, p= .15). Importantly, we found that a positive review of a product with high environmental impact led to significantly higher purchase intention as opposed to a positive review of a product with low environmental
impact ($M_{\text{High Env Impact}} = 6.98, \text{SD} = 1.51; M_{\text{Low Env Impact}} = 5.98, \text{SD} = 1.81; F (1,318) = 11.89, p < .01$). On the other hand, there was no significant difference in terms of purchase intentions and product’s environmental impact with respect to the negative review ($M_{\text{High Env Impact}} = 3.85, \text{SD} = 2.00; M_{\text{Low Env Impact}} = 3.46, \text{SD} = 1.98; F (1,318) = 1.83, p = .18$). Thus, hypothesis 3a was supported while 3b was not supported. Table 3 below summarizes the results of this study.

--- TABLE 3 HERE ---

6. Discussion Study 1

The results of this study only partially support the theoretical arguments of schema-congruity theory (Mandler & Parker, 1976; Mandler, 1981), as well as the moderating role of product type (e.g. Sen & Lerman, 2007); that is, product type, i.e. high versus low perceived environmental impact, moderates the effect of a positive but not that of a negative review on review usefulness, product attitude, and purchase intention.

In this study, we argued that the stronger the information incongruence with mental schema about the environmental impact of products produced by the environmentally-framed review, the higher will be the change in perceived review usefulness, attitude and behaviour (Brehm and Cohen, 1962). In our study, we observed that the environmentally-framed positive review of high-impact environmental products influenced more consumer’s perception of review usefulness, attitude towards the product and purchase intentions compared to positive review of products with low environmental impact. Hence, a positive review emphasizing the eco-friendly properties of harmful products attracts consumers’ attention more because such
information is somehow unexpected and, as explained above, create cognitive dissonance, (positive) surprise, and interest (Mandler, 1981).

However, findings do not prove schema-congruity theory’s arguments when assessing the influence of the negative review in combination with product types. Accordingly, results show there was no difference in consumers’ perception of negative review usefulness, and its impact on product attitude and purchase intention with both high and low environmental impact products. Hence, in this context product type does not moderate the impact of the negative review on perceived usefulness as found in previous studies using other product classifications (e.g. Mudambi and Schuff, 2010).

We support previous findings who show that positive reviews lead to a more favourable attitude towards the product than negative reviews (e.g. Pan and Chiou, 2011, Tsao et al., 2015). The results also support previous studies in advertising research, who found that products with positive environmental messages are viewed better than products with negative environmental messages (Borin et al., 2011).

Overall, the results do not support the negativity bias observed in WOM and eWOM research, in which the negative information/OCR was perceived as more informative, diagnostic, useful, and more impactful on attitude than positive information (Amabile, 1983; Skowronski & Carlston, 1989; Peeters & Czapinski, 1990; Rozin & Royzman, 2001; Purnawirawan et al., 2015; Casaló et al., 2015). We showed that negativity bias does not apply to environmentally-framed consumer reviews of products with low and high impact on the environment. This result might be explained by the low environmental concerns of the respondents in this study, who favour positive over negative consumer reviews. These consumers are keen to praise companies that improve the environmental impact of the
products they sell to make them feel good, but they remove unpleasant stimuli about negative review of high and low impact products.

Study 2

Context

In this study, we aim to better explain the results of study one with a specific focus on negative reviews of high and low-impact products. We tried to ascertain whether the impact of a negative review varies as a function of moral norms and consumers’ environmental concerns. We still consider whether product type, i.e. high versus low environmental impact, moderates the influence of negative reviews carrying environmental messages. Hence, we extend the findings of study one by focusing on a different context, and by integrating new constructs to provide further explanation to the results found in study one for negative reviews.

First, we decided to focus our study on French consumers because France has historically been on the leading edge of eco-friendly projects and regulations, by taking several measures to achieve sustainable development pushed by citizens’ growing environmental concerns. France strongly supported the United Nations’ adoption of the 2030 Agenda for Sustainable Development, the country ranks 5th in the Environmental Performance Index (EPI), which provides a summary of the state of sustainability around the world. According to EuroBarometer (2009), a survey carried out by the Gallup Organization for the Directorate-General for the Environment, French consumers are the most aware and sensitive in the EU about the environmental impact of products bought or used, with 78% saying to be fully aware or to know about the most significant impacts. The previous study was conducted with Italian consumers and Italy ranks only 20th in the EPI index. In the EuroBarometer (2009)’s
survey, a large part of Italian consumers (46%) declared that they know little or nothing about the environmental impact of products bought or used. Moreover, French consumers have a longer tradition of environmental activism and anti-consumption than Italian consumers (Cova & D’Antone, 2016). An emblematic case is the iconic Nutella’s hazelnut spread, who suffered from the attack of French activists arguing against palm oil consumption accused of causing deforestation (Cova & D’Antone, 2016). Hence, France is a suitable context to compare consumers with different a) levels of environmental concerns, b) awareness of environmental regulations, and c) knowledge about products’ environmental impact.

Considering the environmental activism and sensitivity of French consumers towards bad environmental news about companies’ activities, we argue that negative reviews of products with high environmental impact will be perceived as more useful, will have a stronger effect on attitude and purchase intentions than negative reviews of low impact products (see Table 4 for hypotheses).

Furthermore, we included personal norms as potential moderator of the relationship between negative reviews and perceive review usefulness, product attitude, and purchase intentions. We draw upon the arguments of norm-activation model (Schwartz, 1977) as this model fits well the scope of this research because consumers’ behaviour towards products with different environmental impact is a type of pro-social behaviour, which is the concern for other people, the next generation, other species, or the whole ecosystem (e.g., preventing air pollution that may cause risks for others’ health and/or the global climate) (Bamberg & Möser, 2007).

Schwartz’s (1977) norm activation model assumes that personal moral norms, namely feelings of strong moral obligations that people experience for themselves (Schwartz, 1977), foster pro-social behaviour (Thøgersen, 1999). Moral norms are based on the interplay of cognitive, emotional, and social factors (e.g., Bierhoff, 2002). In the field of pro-
environmental behaviour the awareness of and knowledge about environmental problems are probably important cognitive preconditions for developing moral norms (Bamberg & Möser, 2007). Environmentally-framed messages in online reviews may provide the information and knowledge needed to enhance people’s activation of moral norms (Bamberg & Möser, 2007), which foster people’s attitude towards the product and pro-social behaviour (De Pelsmacker and Janssens, 2007). Consumer reviews will be perceived as more useful if they help them identify and uncover company’s wrongdoing, which is often complicated due to deceptive or non-transparent marketing communications (Pickett-Baker and Ozaki, 2008; Chen & Chang, 2013). Creating products that harm the environment is morally wrong (Stern & Dietz, 1986). Negative reviews of products with high environmental impacts increase consumers’ frustration, because they confirm consumer expectation about companies’ morally intolerable behavior, which can flow into boycott or anti-consumption actions (Cova & D’Antone, 2016). Accordingly, the higher the impact of the product on the environment the higher will be activation of moral norms to protect the environment. Hence, we argue moral norms will play a moderator role in the relationship between negative review valence and consumer perception of review usefulness, attitude and behaviour.

H4: Moral norms moderate the effect of negative review valence of products with different environmental impact on review usefulness, product attitude, and purchase intentions such that a negative review of a product with high environmental impact will have a stronger effect on a) review usefulness, b) product attitude, and c) purchase intentions than a negative review of a product with low environmental impact, when personal moral norms are high, but these effects do not occur when moral norms are low.

The theoretical framework and hypotheses are displayed in figure 5 and in Table 4.

--------------------------------------ADD FIGURE 5--------------------------------------
Methodology

Sample

Study 2 focuses on French consumers, who were recruited through Prolific, one of the fastest-growing platforms for the recruitment of online participants to research projects largely used for experimental research (Palan and Schittera, 2018). The survey was only available in English language and one of the criteria used to select participants was a good level of English. A total of 250 questionnaires were used for data analysis, while 8 were excluded because they failed the attention check. The participants in Study 2 show similar demographic characteristic to those in Study 1 (see Appendix 4 for details).

Procedures and Measures

The experiment stimulus was almost the same as adopted in Study one with the only difference that any information about the performance of the products was removed to avoid any confounding effects of product’s perceived quality (i.e. battery life and power). The stimuli used in Study 2 are reported in figure 7. Measures adopted in study two were the same as used in study one. We introduced personal moral norms in the model, which was measured using a 4-items scale (Schwartz, 1977), asking consumers to state their agreement/disagreement to the following statements: “I feel a moral obligation to protect the environment”; “I feel that I should protect the environment”; “I feel it is important that people in general protect the environment”; “Our environmental problems cannot be ignored” (1= Strongly Disagree, 9 = Strongly Agree, Cronbach's alpha = 0.90). As in the previous study, we again measured environmental concerns prior to the exposure to the stimuli in order to capture the participant’s general belief related to environmental concern (α = 0.91).
Manipulation checks

Review valence was significantly different across the four groups (F=442.53, p<.001). Positive reviews were significantly more positive than the negative reviews (M_{Positive}=6.37 (SD=1.05), M_{Negative}=1.49 (SD=.94), F=1296.84, p<.001). Moreover, both the reviews of products with high environmental impact (M_{PositiveHighImpact}=6.13 (SD=1.26); M_{NegativeHighImpact}=1.49 (SD=.70), F=405.92, p<.001) and low product’s environmental impact were significantly different (M_{PositiveLowImpact}=6.13 (SD=1.26); M_{NegativeLowImpact}=1.49 (SD=.70), F=1371.85, p<.001). We further checked the believability across the four conditions and there were no significant differences (M_{PositiveLowImpact}=3.60 (SD=1.81), M_{PositiveHighImpact}=3.66 (SD=1.94), M_{NegativeLowImpact}=3.17 (SD=1.59), M_{NegativeHighImpact}=3.49 (SD=1.75), F=.804, p=.49). We thus deemed the four groups to be manipulated appropriately in terms of valence, and comparable in terms of believability. Finally, the four groups did not differ significantly in terms of their environmental concern, showing that they all had comparable concerns towards the environment (F=.69, p=.56). This variable was measured prior to the exposure to the stimuli in order to capture the participant’s general belief related to environmental concern.

Results

As in Study 1, we first examined the effect of product type (high versus low environmental impact). MANOVA showed that the two different product types did not have significant effect on consumer responses (Wilks’ λ: F = 2.06; p = .11; partial η² = .024). The difference between the high and the low environmental impact product types was not significant for review usefulness (M_{Low_Env_Impact} = 6.27, SD = 1.46; M_{High_Env_Impact} = 6.59, SD = 1.80; F = -1.53, p = .13; partial η² = .009), attitude towards the product (M_{Low_Env_Impact} = 5.1, SD = 2.24;
More specifically, the direct effects of the two conditions on the three dependent variables were as follows: MANOVA showed that review valence had a significant effect on consumer responses (Wilks’ $\lambda$: $F = 80.438, p < .001$, partial $\eta^2 = .495$), specifically for attitude towards the product ($M_{positive\ rev} = 6.50, SD = 1.71$; $M_{negative\ rev} = 3.17, SD = 1.74$; $F = 15.261, p < .001$; partial $\eta^2 = .484$) and purchase intention ($M_{positive\ rev} = 5.83, SD = 2.20$; $M_{negative\ rev} = 3.43, SD = 1.94$; $F = 9.143, p < .001$; partial $\eta^2 = .252$) but not for perceived review usefulness ($M_{positive\ rev} = 6.38, SD = 1.60$; $M_{negative\ rev} = 6.49, SD = 1.70$; $F = .527, p = .60$; partial $\eta^2 = .001$).

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Hypotheses Testing

In order to test the hypotheses of this study, ANOVA examined the interaction effects of review valence and product environmental impact on consumer responses. The interaction effect between review valence and product type on review usefulness was not significant ($F(1,249) = 3.17, p = .28$). Simple effects test were again conducted to further examine the effects across the conditions. Specifically, review usefulness was not significantly different with regards to positive reviews for the two product types ($M_{High\ Env\ Impact} = 6.43, SD = 1.76$; $M_{Low\ Env\ Impact} = 6.33, SD = 1.44$; $F(1,246) = .11, p = .74$). But respondents reported that the negative review of the product with high environmental impact was marginally significantly more useful as opposed to the negative review of the product with low environmental impact ($M_{High\ Env\ Impact} = 6.76, SD = 1.84$; $M_{Low\ Env\ Impact} = 6.21, SD = 1.49$; $F(1,246) = 3.38, p = .07$). Therefore, H1a is not supported but H1b is supported.
H2 predicted the interaction between review valence and product environmental impact type on attitude towards the product. Review valence significantly moderated the effect of the consumer review about a product with high vers us low environment impact on product attitude as hypothesized (F (1,249) = .592, p = .44). Specifically, attitude towards product was not significantly different with regards to positive reviews for the two product types (M_{High\_Env\_Impact} = 6.37, SD = 1.76; M_{Low\_Env\_Impact} = 6.63, SD = 1.66; F (1,246) = .73, p = .39). But respondents reported that the negative review of a product with high (as opposed to low) environmental impact led to marginally significantly more negative attitudes (M_{High\_Env\_Impact} = 2.88, SD = 1.9; M_{Low\_Env\_Impact} = 3.47, SD = 1.52; F (1,246) = 3.68, p = .06). Therefore, H2a is not supported but H2b is supported.

Finally, we examined the effect of review valence on purchase intentions taking into account the moderation of product type (H3). The interaction effect was not significant (F (1,246) = .004, p = .95). Purchase intention was not significantly different with regards to positive reviews (M_{High\_Env\_Impact} = 5.77, SD = 2.21; M_{Low\_Env\_Impact} = 5.89, SD = 2.21; F (1,246) = .11, p = .74) and negative reviews (M_{High\_Env\_Impact} = 3.35, SD = 2.03; M_{Low\_Env\_Impact} = 3.51, SD = 1.85; F (1,246) = .17, p = .68). Thus, neither H3a nor H3b is supported.

Moderating role of personal moral norms

We used a bootstrapping-based method (with 5,000 resamples) and ran PROCESS Model 1 (Hayes, 2017) to test H4 (a, b). The high and low environmental impacts of product were the independent variables (coded: Low = 1, High = 2) and the continuous moderator was estimated at +/- 1 SD as per the setting in PROCESS. We ran the model separately for negative and positive reviews. We examined the effects of the negative reviews of products
with high vs. low environmental impact on the dependent variables, accounting for the moderating role of personal moral norms. There was a significant interaction of product type and moral norms on perceived review usefulness (F (1,119) = 7.10; p < .01; b = .62, SE = .23). The conditional effects showed that a negative review of a product with high environmental impact (vs. a negative review of a product with low environmental impact) led to a significantly higher review usefulness when participants had high moral norms (M\_{Moral Norms} = 8.80, b = 1.17, SE = .39, p < .01), but not when participants had lower moral norms (M\_{Moral Norms} = 6.39, b = -.32, SE = .40, p = .43). Hence, H4a was supported. We did not detect any direct moderating effects on product attitude (b = -.24, p = .36). While there were marginally significant interaction effects on purchase intentions (b = -.60, p = .09), the conditions effects were not significant (M\_{Moral Norms} = 6.39, b = .53, p = .26; M\_{Moral Norms} = 8.80, b = -.60, p = .20). Hence, H4b and H4c were not supported.

Albeit non-hypothesised, we further examined if review usefulness mediated the effects of negative reviews of high (vs. low) environmental impact product on product attitude and indirectly on purchase intentions, considering the moderation of personal moral norms. We tested the following moderated serial mediation with PROCESS model 83 (Hayes, 2017; 5000 bootstrapping resamples, 95% CI): high and low environmental impact product (Low = 1, High = 2), personal norms as continuous moderator (estimated at +/- 1 SD), review usefulness as the first mediator, product attitude as the second mediator, and purchase intentions as the final dependent variable. Given the results of the above analysis, we only examined negative reviews of high versus low environmental impact products. The moderation output (high versus low environmental impact * personal moral norms => review usefulness) is reported above. Furthermore, the results show that review usefulness has a significant negative effect on product attitude (b = -.20, SE = .09, p < .05) and purchase
intentions (b = -.56, SE = .08, p < .001). We then estimated the mediating effects. The conditional indirect effects of products with high (versus low) environmental impact on purchase intentions through review usefulness were negative and significant when moral norm was high (M_{MoralNorms} = 8.80, b = -.65, SE = .23, 95% CI = -1.14, -.26), but not significant when moral norms was low (M_{MoralNorms} = 6.39, b = .18, SE = .22, 95% CI = -.25, .62). The index of moderated mediation suggested that the difference between the two coefficients was significant (index = -.34, SE = .13, 95% CI = -.61, -.12). Moreover, the moderated serial mediation (high versus low environmental impact * personal moral norms => review usefulness => product attitude => purchase intentions) was also significant. The mediating effects of review usefulness and product attitude on purchase intentions were negative and significant when moral norms were high (M_{MoralNorms} = 8.80, b = -.10, SE = .06, 95% CI = -.25, -.01), but not significant when moral norms were low (M_{MoralNorms} = 6.39, b = .03, SE = .04, 95% CI = -.04, .13). The moderated mediation index was significant (index = -.05, SE = .03, 95% CI = -.14, -.004).

Post-hoc analysis - Environmental concerns in Study 1 and Study 2

There is earlier evidence suggesting that French citizens assign higher importance to the environmental protection than Italians and are also more knowledgeable about the environmental impact of products (EuroBarometer, 2009). As such, Italian consumers are expected to be less concerned about environmental issues than French consumers. In order to assess these differences, we compared the level of environment concerns of the two populations that took part in our study by conducting independent samples t-test of the reported environmental concerns. The participants in Study 1 (i.e. Italian consumers) reported
a significantly lower environmental concern than the participants in Study 2 (i.e. French consumers): Study 1: M=6.32 (SD=1.61); Study 2: M=7.97 (SD=1.16); t=13.71; p<.001.
These results provide empirical support that the participants in Study 1 experience less concerns with regards to the environmental issues than the participants in Study 2.

---------ADD TABLE 4---------

Overall Discussion and Theoretical Contribution

This is the first study that investigates the influence of positive and negative reviews carrying environmentally-framed messages of products perceived to have high versus low environmental impact, on perceived review usefulness, attitude, and behaviour. Two experimental studies were conducted with consumers showing high (i.e. France) and low environmental concerns (i.e. Italy). By doing so, we advance eWOM literature on review valence, negativity bias, and the moderating role of product type (e.g. Park & Lee, 2009; Pan & Chiou, 2011; Sen & Lerman, 2007; Zhu & Zhang, 2010; Mudambo & Schuff, 2010; Cao et al., 2011; Wu, 2013; Lee & Shin, 2014; Casaló et al., 2015; López-López & Parra, 2016; Filieri et al., 2018), by acknowledging the importance of environmental arguments about products and their perceived environmental impact (high versus low) in eWOM.

Our findings support, in the new context of “environmentally-framed eWOM”, the contrasting results obtained by previous studies regarding the impact of review valence (positive versus negative reviews) on consumers’ behaviour (e.g. Wu, 2013; Lin and Xu, 2017). For example, some studies revealed the presence of negativity bias in both WOM and eWOM settings (Laczniak et al., 2001; Mizerski, 1982; Yang and Mai, 2010; Casaló et al., 2015), while other scholars found the presence of positivity bias in the context of hedonic products (Gershoff, Mukerjee, and Mukhopadhyay, 2003). Whereas, Wu (2013) conclude that the negativity bias documented in the psychology literature may not be applicable to the context of eWOM.
Scholars advanced that product type may moderate the relationship between review valence and attitudinal and behavioural outcomes (e.g. Sen and Lerman, 2007; Mudambi and Schuff, 2010; Cui et al., 2011; Ketron, 2017).

In this study, we argued that the impact of positive and negative reviews on perceived review usefulness, product attitude, and purchase intention varies as a function of the perceived product impact on the environment (high versus low). In Study 1, we observed a significant effect of a positive review about high impact products on perceived review usefulness, product attitude, and purchase intention; while in Study 2, a negative review of high impact products was found to be perceived as significantly more useful, and produced a more negative attitude towards the product than a negative review of a low-impact product. Hence, the findings of the two studies suggest that products perceived to have a high impact on the environment moderate the impact of both positive and negative environmentally-framed reviews about them, confirming that environmental messages about products with high environmental impact make a difference in consumer product attitude and resulting behavioural intention (Kong & Zhang, 2014). Consumers value as more useful the consumer reviews discussing the eco-friendly properties of products that are generally associated with high levels of environmental impact and they develop a better attitude towards them compared to those associated with low levels of environmental impact.

In this study we draw upon schema congruity theory (Festinger, 1962; Mandler, 1981) stating that the information contained in online reviews can be more or less surprising, hence impactful, based on how incongruent they are with consumers’ mental schema, and not necessarily because of its positive or negative valence. However, the results of Study 1 support schema congruity theory arguments only for the positive review. We speculated the
positivity bias may be due to the tendency of consumers with low environmental concerns to remove and forget about unpleasant feelings.

In Study 2 we attempted to understand whether product type moderate the influence of negative reviews in a different context where there is a longer tradition of environmental regulations that respond to consumers’ higher environmental concerns. The experimental findings of Study 2 show that product type moderated the impact of a negative review on review usefulness and product attitude (but not on purchase intention) of a product perceived as more harmful for the environment.

Despite the seemingly contrasting results, a theoretical explanation can be advanced for the two studies. Expectancy disconfirmation theory (EDT) (Oliver, 1980; Churchill & Surprenant, 1982) can be useful for this purpose. EDT assumes that consumers go through a cognitive evaluation process in which pre-purchase expectations or prior beliefs about the performance of a product are compared to existing cognitions about the product performance (Oliver, 1980; Westbrook & Reilly, 1983). The result of this comparison is expectancy disconfirmation, which ranges from negative (i.e. product performance falls below expectations) to positive (i.e. expectations surpass product performance) (Westbrook & Reilly, 1983). Online consumer reviews of different valence of high impact products enable consumers to positively or negatively disconfirm their beliefs or expectations about products’ environmental performance before buying them. Our results show that in Study 1, consumers experience a positive disconfirmation of their expectation, judging the positive consumer review as useful and showing a more positive attitude and purchase intentions towards high-impact products. In Study 2 a negative disconfirmation occurs, whereas consumers find more useful and change their attitude after reading a negative review about the high environmental impact of a product. Specifically, low expectations and/or high environmental product
performance produced positive disconfirmation, whereas high expectations and/or low performance manipulations produced negative disconfirmation (Churchill & Surprenant, 1982).

The findings can be further explained by the different levels of environmental concern of the participants in our two studies. Environmental concern is an important construct in green marketing research. Previous research shows that environmental concern moderates the effectiveness of negative versus positive environmental information in product labels (Grankvist et al., 2004). Accordingly, the post-hoc analysis reveal that Italian consumers are significantly less concerned about environmental issues than French consumers. The two samples also differ significantly with regards to their knowledge about products’ environmental impact (EuroBarometer, 2009), and environmental protection regulations. Moreover, Italy and France differ markedly in terms of consumer activism and attitudes towards the issue of sustainable consumption and production (EuroBarometer, 2009). French consumers have a long tradition of consumer activism with respect to environmental issues, including boycott activities of companies that are found guilty of harming the environment and society (Cova & D’Antone, 2016). French consumers are experienced in anti-consumption behaviors and knowledgeable about sustainability issues (Cova & D’Antone, 2016). In a context in which there is generalized institutional effort to implement environmental policies (like France), consumers who are highly concerned about environmental issues would feel companies are not fulfilling their promises and they are violating an assumed and intangible contract, and their action are blameworthy. Hence, consumers in this context will be particularly sensitive towards negative information about products that cause damage to the environment. This partly supports Grankvist et al. (2004)’s results showing that consumers with a strong environmental concern are affected the most by
both positive and negative environmental information, while those with an intermediate concern are affected more by negative than by positive information. By and large, this study highlights the importance of the differences in consumer values in the evaluation of the effects of eWOM valence carrying environmental messages.

In Study 2, we extended the findings by introducing moral norms as moderator of the relationship between negative reviews and consumer perception of review usefulness, their attitude towards the reviewed product, and purchase intention. Findings suggest that consumer reviews containing negative information about the environmental impact of products are perceived as more useful by people who feel a moral obligation of protecting the environment. Environmental-framed messages in online reviews provide the information and knowledge about the environmental impact of products and, if negative, they activate moral norms (Bierhoff, 2002; Bamberg & Möser, 2007), which directly influence their perceived usefulness, but not attitude and behaviour. The norm-activation model posits that moral personal norms, namely feelings of strong moral obligations that people experience for themselves and others (Schwartz, 1977), foster pro-social behaviour (e.g. pro-environmental buying) (Thøgersen, 1999). Consumers with high moral norms perceived a negative review of a product with high environmental impact to be significantly more useful than a negative review of a product with low environmental impact, while those with lower moral norms did not exhibit the same reactions. These moderating effects were not observed for product attitude and purchase intentions.

However, the serial moderated mediation demonstrated that perceived review usefulness plays a crucial role, as it further affects consumer’s attitude towards the product and also purchase intentions. In other words, those with high moral norms perceived more useful a negative review about a product with high as opposed to low environmental impact, which
negatively influenced both their attitude towards the product and purchase intention. Conversely, those who did not hold high moral norms about environmental protection would not perceive such differences on product attitude and purchase intentions via review usefulness.

In summary, the results of the two experimental studies show the contingent nature of the negativity bias of reviews containing information about the environmental impact of products. Our results suggest that a negative review with environmental content is particularly impactful when the impact of a product on the environment is high as well as consumers show high levels of environmental concerns, and activate personal moral norms of environmental protection. In our study negative reviews were important only when they produced a negative disconfirmation with consumers showing high environmental concerns, which suggests that an environmentally-framed message in a review is not always more diagnostic (e.g. Herr et al., 1991; Royzin & Royzman, 2001), or have a stronger impact on attitude (Sen & Lerman, 2007), than a positive environmentally-framed message.

7. Managerial implications

Several large companies in various industries are increasingly launching environmentally-friendly products and packaging (e.g. Coca Cola Life, BMW’s i plug-in electric vehicles brand, and the like), which show their willingness to improve their brand image and makes the brand relevant to consumers at a time when their priorities are changing. However, these companies face consumer scepticism due to higher level of mistrust towards companies and their real interest towards protecting the environment (Parguel et al., 2011). A growing number of consumers, especially Millennials, increasingly search online for consumer
reviews to assess the quality and performance of the products they buy (Filieri, 2015).

Consumer trust and rely on eWOM to know more about the real quality of products and firms’ operations. This study recommends marketing managers to constantly monitor what consumers say about the environmental impact of their products in digital platforms, and specifically on online communities and websites led by environmental groups that allow consumers to publish OCRs about products and brands. Consumers’ attitude and perceptions are affected by OCRs, which also have a strong impact on companies’ sales (e.g. Chevalier & Mayzlin, 2006).

The results of this research suggest that the influence of positive and negative reviews, discussing new eco-friendly features of products that are generally perceived as dangerous for the environment, depends on the environmental concerns of consumers and can be country-specific. A recommendation to companies operating in countries with low environmental concerns is that positive environmentally-framed consumer reviews of products generally considered as harmful can have a strong impact on consumers’ information perception, product attitude, and intention to purchase. Hence, these companies could integrate OCRs in their marketing activities to communicate the environmental improvement of the products they sell. Considering that user-generated content is perceived as more trustworthy and credible than company-initiated communications (Bickart and Schindler, 2001), particularly for green products, eWOM is expected to produce higher effects than marketing communications.

Moreover, managers of companies producing products with high environmental impact should pay particular attention to negative online consumer reviews in contexts in which consumers are highly sensitive towards environmental issues, and especially with consumers who feel a moral obligation to protect the environment. The latter will judge more useful the
negative reviews of products with higher impact on the environment, they will develop a negative attitude towards them, and as a consequence, they will not purchase such products. Furthermore, in these settings consumers might even decide to start boycott initiatives towards these companies and products in order to more actively engage in the protection of the environment.

8. Limitations and future research directions

As all studies, ours is not exempt from limitations. First, we used of a convenience sample in Study 1 and the type of products used in the experiment. The risks of using a convenience sample are the respondent self-selection error and non-generalisability of the findings to the target population (Malhotra, 2010). However, this sampling technique was used in analogous studies (Kong and Zhang, 2014; Park and Lee, 2009; Sen and Lerman, 2007), and respondents, in this study, were all users of online reviews. Second, this study considered two countries, Italy and France. Although these countries have a different tradition in terms of environmental regulations, they are both are European countries, and in the top 20 in the environmental protection index (France: 2nd, Italy: 21st). Future research could evaluate consumers from extra-European contexts where environmental activism and the knowledge about environmental product impacts is lower (e.g. China, EPI rank: 129th).

This study used an experiment including two low-involvement products (e.g. batteries and cereals) in order to strengthen its validity. However, future research should replicate the study with high-involvement products as the influence of review valence may vary across high versus low involvement products.
Moreover, the stimuli in Study two was slightly different than in study one. Specifically, information about the performance of the products was removed from Study two to avoid any confounding effects of product’s perceived quality (i.e. battery life and power). This might have caused some differences in the two studies. Since consumers unlikely to base their decisions only on the environmental characteristics of the product, we recommend future studies to include information about product performance (Davis, 1993).

This paper opens up avenues for future research integrating consumer sustainable consumption decisions and eWOM. Future research could investigate the moderating effect of brand equity dimensions, such as perceived quality and brand image; or user-generated content features, such as average rating score in a set of reviews, review helpful votes, product popularity signals.

Furthermore, scholars could investigate the mediating role of environmental involvement in the hypothesized relationship between review valence and purchase intention. Research has shown that consumers with high environmental are more likely to choose environmentally-friendly products (e.g. facial cream with recycled packaging) than low involvement ones (Bhate, 2002). It would be interesting to measure whether environmental involvement moderates the effects of different types of review valence (extremely negative, negative, neutral, positive and extremely positive) on products with different impact on the environment.

Moreover, future research could investigate if consumers’ environmental knowledge acts as a moderator of review valence. Indeed, Grunert (1993) found that specific knowledge of the characteristics of organic food served as a predictor of the purchase of such products.
References


Filieri, R., Galati, F., & Raguseo, E. (2020). The impact of service attributes and category on eWOM helpfulness: An investigation of extremely negative and positive ratings using


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**STUDY 1**

![Proposed conceptual framework](image)

**Figure 1.** Proposed conceptual framework

**Figure 2.** Experimental stimuli used in the study.

**Stimulus Group 1: Positive review of batteries**
Stimulus Group 2: Negative review of batteries

Stimulus Group 3: Positive review of cereals
Stimulus Group 4: Negative review of cereals

Figure 3. Differences in review usefulness for positive and negative review valence; 95% CI error bars
Figure 4. Differences in product attitudes for positive and negative review valence, 95% CI error bars
### Table 1. Pre-test 1 – Descriptive Statistics

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived harmfulness of conventional cleaning products</td>
<td>2</td>
<td>7</td>
<td>5.28</td>
<td>1.20</td>
</tr>
<tr>
<td>Perceived harmfulness of air fresheners</td>
<td>1</td>
<td>7</td>
<td>4.81</td>
<td>1.50</td>
</tr>
<tr>
<td>Perceived harmfulness of light bulbs</td>
<td>1</td>
<td>7</td>
<td>4.40</td>
<td>1.37</td>
</tr>
<tr>
<td>Perceived harmfulness of batteries</td>
<td>3</td>
<td>7</td>
<td>5.72</td>
<td>1.16</td>
</tr>
<tr>
<td>Perceived harmfulness of cereals</td>
<td>1</td>
<td>7</td>
<td>1.93</td>
<td>1.42</td>
</tr>
<tr>
<td>Perceived harmfulness of office paper</td>
<td>1</td>
<td>7</td>
<td>4.44</td>
<td>1.50</td>
</tr>
<tr>
<td>Perceived harmfulness of canned vegetables</td>
<td>1</td>
<td>7</td>
<td>3.70</td>
<td>1.26</td>
</tr>
<tr>
<td>Perceived harmfulness of cotton t-shirts</td>
<td>1</td>
<td>5</td>
<td>2.30</td>
<td>1.12</td>
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</table>

### Table 2. Demographic characteristics of the sample

<table>
<thead>
<tr>
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<th>Percentage</th>
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<tbody>
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<td>Gender</td>
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<td>Male</td>
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</tr>
<tr>
<td>Female</td>
<td>47</td>
<td>150</td>
</tr>
<tr>
<td>Age</td>
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<td></td>
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<td>18-24</td>
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<td>57</td>
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<tr>
<td>25-34</td>
<td>53</td>
<td>171</td>
</tr>
<tr>
<td>35-44</td>
<td>16</td>
<td>52</td>
</tr>
<tr>
<td>45-54</td>
<td>6</td>
<td>19</td>
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<tr>
<td>55+</td>
<td>7</td>
<td>22</td>
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<tr>
<td>Education</td>
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<tr>
<td>Secondary School</td>
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<td>116</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>20</td>
<td>64</td>
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<tr>
<td>Master’s Degree or above</td>
<td>44</td>
<td>141</td>
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Table 3. Hypotheses tested in study one. Summary of results.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Study 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1</strong></td>
<td>Product type (high vs. low environmental impact) moderates the effect of review valence on review usefulness such that:</td>
</tr>
<tr>
<td><strong>H1a</strong></td>
<td>Positive reviews of a product with high (vs. low) perceived environmental impact will be perceived as more useful.</td>
</tr>
<tr>
<td><strong>H1b</strong></td>
<td>Conversely, a negative review of a product with a low (vs. high) environmental impact will be perceived as more useful.</td>
</tr>
<tr>
<td><strong>H2</strong></td>
<td>Product type (high vs. low environmental impact) moderates the effect of review valence on product attitude such that:</td>
</tr>
<tr>
<td><strong>H2a</strong></td>
<td>Positive reviews of products with high (vs. low) perceived environmental impact will lead to a more positive product attitude.</td>
</tr>
<tr>
<td><strong>H2b</strong></td>
<td>Negative reviews of products with low (vs. high) perceived environmental impact will lead to a more negative product attitude</td>
</tr>
<tr>
<td><strong>H3</strong></td>
<td>Product type (high vs. low environmental impact) moderates the effect of review valence on purchase intention such that:</td>
</tr>
<tr>
<td><strong>H3a</strong></td>
<td>Positive reviews of products with high (vs. low) perceived environmental impact will lead to a greater purchase intention.</td>
</tr>
<tr>
<td><strong>H3b</strong></td>
<td>Negative reviews of products with low (vs. high) perceived environmental impact will lead to lower purchase intention.</td>
</tr>
</tbody>
</table>
Study 2

Figure 5. Perceived review usefulness across product types; 95% CI error bars

Figure 6. Conceptual framework. Study 2
Figure 7.
Experimental stimuli. Study two.

### Stimulus group 1. Positive review of batteries

![Image of batteries]

**Customer Reviews**

Not harmful for the environment
By Amazon Customer on March 10, 2017

AA Alkaline Powerloop batteries have a low impact on the environment because they don’t contain mercury, cadmium and lead and because they have the triple layer structure preventing batteries from acid spills. I recommend the purchase.

### Stimulus group 2. Negative review of batteries
Stimulus group 3. Positive review of cereals

CerealFarm Corn Flakes have a low impact on the environment because they are produced through sustainable agriculture, are free from artificial fertilizers, and clean energy is used to produce them. I recommend the purchase.

Stimulus group 4. Negative review of cereals

CerealFarm Corn Flakes have a low impact on the environment because they are produced through sustainable agriculture, are free from artificial fertilizers, and clean energy is used to produce them. I recommend the purchase.
Figure 8. Moderating effect of personal moral norms on review usefulness for negative reviews of product with high vs. low environmental impact

Table 4.
Hypotheses tested in Study 2. Summary of results.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Results</th>
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<tbody>
<tr>
<td>H1: Product type (high vs. low environmental impact) moderates the effect</td>
<td>Supported</td>
</tr>
<tr>
<td>of negative review valence on review usefulness</td>
<td></td>
</tr>
</tbody>
</table>
review usefulness such that: a negative review of a product with a high (vs. low) environmental impact will be perceived as more useful.

**H2**

Product type (high vs. low environmental impact) moderates the effect of negative review valence on product attitude such that: Negative reviews of products with high (vs. low) perceived environmental impact will lead to a more negative product attitude.

**H3**

Product type (high vs. low environmental impact) moderates the effect of negative review valence on purchase intention such that: Negative reviews of products with low (vs. high) perceived environmental impact will lead to lower purchase intention.

**H4**

Moral norms moderate the effect of negative review valence of products with different environmental impact on review usefulness, product attitude, and purchase intentions such that a negative review of a product with high environmental impact will have a stronger effect on a) review usefulness, b) product attitude, and c) purchase intentions than a negative review of a product with low environmental impact, when personal moral norms are high, but these effects do not occur when moral norms are low.

**Non-hypothesized**

Perceived review usefulness mediate the effect of a negative review of high impact product on product attitude and purchase intention when moral norms are high.