"The double-edged sword of multi-labelling in food consumer behaviour: the case of the addition of an Eco-Score to a Nutri-Score"

Dorisse, Axelle ; Charry, Karine ; Parguel, Béatrice

ABSTRACT

Labelling is tool for marketers to offer condensed and easy-to-process information about food products' attributes to consumers (e.g., organic labels); but also for public policy-makers to foster nutritious and sustainable food purchases (e.g., Nutri-Score). Yet, multi-labelling (i.e., displaying several labels on a packaging) can be effective (e.g., improving the product's value) or counterproductive (e.g., decreasing one of the label's value). Little research has been made on multi-labelling when the labels have simultaneously positive and negative valences (i.e., one label is perceived positively, the other negatively). However, such a situation could confuse consumers and therefore, harm multi-labelling ability to inform consumers clearly, and to promote healthy and sustainable food. Furthermore, to the state of our knowledge, multi-labelling has not been studied through the prism of information processing, and we think that multi-labelling could be processed by system 1 or system 2 (according to Kahneman's theory, 2011) depending on the combination of labels. We investigate the impact of adding an Eco-Score (alternatively with a positive and a negative valence) to a Nutri-Score (with a positive valence), on consumers' ways of processing and purchasing behaviours. We conducted an online between-subjects experiment comparing 3 conditions: (1) a combination of Nutri-Score A and Eco-Score B, (2) a combination of Nutri-Score A and Eco-Score E, and (3) a Nutri-Score A. Our results indicate that multi-labelling is a double-edged sword. In comparison with displayin...

CITE THIS VERSION

LOU
RIM

LOUVAIN
RESEARCH INSTITUTE
IN MANAGEMENT
AND ORGANIZATIONS

WORKING PAPER

2023-16

The double-edged sword of multi-labelling in consumer food behaviour: the case of the addition of an Eco-Score to a Nutri-Score

Axelle Dorisse,
Karine Charry,
Louvain Research Institute in Management and Organizations

Béatrice Parguel,
CNRS – Université Paris Dauphine

LOUVAIN RESEARCH INSTITUTE IN MANAGEMENT AND ORGANIZATIONS

Louvain Research Institute in Management and Organizations
Working Paper Series
Editor: Prof. Valérie Swaen
(president-lourim@uclouvain.be)

The double-edged sword of multi-labelling in consumer food behaviour: the case of the addition of an Eco-Score to a Nutri-Score

Axelle Dorisse, Louvain Research Institute in Management and Organizations
Karine Charry, Louvain Research Institute in Management and Organizations
Béatrice Parguel, CNRS – Université Paris Dauphine

Summary

In the last decade, labels have been multiplying on the food market; as a marketing tool to offer condensed and easy-to-process information about food products' attributes to consumers (e.g., organic labels); but also as a public-policy tool to foster nutritious and sustainable food purchases (e.g., Nutri-Score). Yet, multi-labelling (i.e., displaying several labels on a packaging) can be effective (e.g., improving the product's value) or counterproductive (e.g., decreasing one of the label's value). Little research has been made on multi-labelling when the labels have simultaneously positive and negative valences (i.e., one label is perceived positively, the other negatively). However, such a situation could confuse consumers and therefore, harm multi-labelling ability to inform consumers clearly, and to promote healthy and sustainable food. Furthermore, to the state of our knowledge, multi-labelling has not been studied through the prism of information processing, and we think that multi-labelling could be processed by system 1 or system 2 (according to Kahneman's theory, 2011) depending on the combination of labels.

To bridge these gaps, we investigate the impact of displaying simultaneously an Eco-Score (alternatively with a positive and a negative valence) and a Nutri-Score (with a positive valence), on consumers' ways of processing and purchasing behaviours. To do so, we conducted an online between-subjects experiment comparing 3 conditions: (1) a combination of Nutri-Score A and Eco-Score B, (2) a combination of Nutri-Score A and Eco-Score E, and (3) a Nutri-Score A.

Our results indicate that multi-labelling is a double-edged sword. In comparison with displaying a Nutri-Score A: displaying a Nutri-Score A and an Eco-Score B enhances moral satisfaction (i.e., the personal benefits one derives when he/she contributes positively to certain causes) among the most ecology-conscious consumers, though it does not significantly increase purchase intentions. Displaying a Nutri-Score A and an Eco-Score E increases consumer confusion (i.e., "a negatively valenced state of mind with emotional and cognitive components in which consumers lack comprehension or understanding of marketplace stimuli" (Fitzgerald et al., 2019, p. 308)), without negatively impacting purchase intentions. Furthermore, consumers process multi-labelling through two different routes: an automatic one (that does not require mental effort) and a cognitive one (that does require mental effort), depending on the valences of the combined labels. These routes correspond to the two systems of Kahnemn (2011) in the information processing literature. Based on these results, we contribute to three streams of literature (multi-labelling, consumer confusion and information processing) and provide recommendations to food managers and public policy makers.

Keywords : Ecolabels; nutrition labels; food; multi-labelling; consumer confusion.

JEL Classification: M31

This working paper is part of Axelle Dorisse's thesis which is funded by the "Entreprendre.Wapi" chair in "Consumer behaviour in food issues", held by Prof. Charry.

Corresponding author:
Axelle Dorisse
Louvain Research Institute in Management and Organizations / Campus Mons
Université catholique de Louvain
151 Chaussée de Binche, 7000, Mons, Belgium
Email : axelle.dorisse@uclouvain.be

The double-edged sword of multi-labelling in food consumer behaviour: the case of the addition of an Eco-Score to a Nutri-Score

Axelle Dorisse

(corresponding author)

Université catholique de Louvain - LouRIM (Belgium)

151 Chaussée de Binche, 7000, Mons, Belgium

Email: axelle.dorisse@uclouvain.be

Karine Charry

Université catholique de Louvain - LouRIM (Belgium)

Email: karine.charry@uclouvain.be

Béatrice Parguel

CNRS / Université Paris-Dauphine PSL (France)

Email: beatrice.parguel@dauphine.psl.eu

Abstract:

Labelling is tool for marketers to offer condensed and easy-to-process information about food products' attributes to consumers (e.g., organic labels); but also for public policy-makers to foster nutritious and sustainable food purchases (e.g., Nutri-Score). Yet, multi-labelling (i.e., displaying several labels on a packaging) can be effective (e.g., improving the product's value) or counterproductive (e.g., decreasing one of the label's value). Little research has been made on multi-labelling when the labels have simultaneously positive and negative valences (i.e., one label is perceived positively, the other negatively). However, such a situation could confuse consumers and therefore, harm multi-labelling ability to inform consumers clearly, and to promote healthy and sustainable food. Furthermore, to the state of our knowledge, multi-labelling has not been studied through the prism of information processing, and we think that multi-labelling could be processed by system 1 or system 2 (according to Kahneman's theory, 2011) depending on the combination of labels.

We investigate the impact of adding an Eco-Score (alternatively with a positive and a negative valence) to a Nutri-Score (with a positive valence), on consumers' ways of processing and purchasing behaviours. We conducted an online between-subjects experiment comparing 3 conditions: (1) a combination of Nutri-Score A and Eco-Score B, (2) a combination of Nutri-Score A and Eco-Score E, and (3) a Nutri-Score A.

Our results indicate that multi-labelling is a double-edged sword. In comparison with displaying a Nutri-Score A: adding an Eco-Score B to a Nutri-Score A enhances moral satisfaction (i.e., the personal benefits one derives when he/she contributes positively to certain causes) among the most ecology-conscious consumers, though it does not significantly increase purchase intentions. Adding an Eco-Score E to a Nutri-Score A increases consumer confusion without negatively impacting purchase intentions. Furthermore, consumers process multi-labelling through two different routes: an automatic one (that does not require mental effort) and a cognitive one (that does require mental effort), depending on the valences of the combined labels. These routes correspond to the two systems of Kahneman (2011) in the information processing literature. Based on these results, we contribute to two streams of literature (multi-labelling and consumer confusion) and provide recommendations to food managers and public policy makers.

Keywords : Ecolabels; nutrition labels; food; multi-labelling; consumer confusion.

1. Introduction

Food labeling includes "any written, printed or graphic matter that is present on the label, accompanies the food, or is displayed near the food, including that for the purpose of promoting its sale or disposal" (Food and Agriculture Organization, 2001). Food labels provide condensed and easy-to-read information aiming at reducing consumers' uncertainty (Thøgersen & Nielsen, 2016). In 2021, In 2021, the International Trade Center reported that 129 independent front-of-package labels cover sustainability-related aspects (Bishop et al., 2022).

Among these labels, scorings assign a score to a product based on certain characteristics. The Nutri-Score evaluates the nutritional quality of a product by attributing a letter and a color from A/green to E/red (Santé Publique France, 2022). Public policy-makers are very interested this tool as its harmonization and compulsoriness are still debating at the EU level (Gérard, 2023). Similarly, the Eco-Score reflects a product's environmental footprint (Askew, 2021) and the European Commission received a citizen initiative about a European Eco-Score (Pistorius & Foot, 2021). While neither of them is compulsory, certain companies or retailers use both almost systematically (e.g., the retailer Colruyt offers the Nutri-Score and the Eco-Score for most of its private brand products). Yet, in a context of rising food-related diseases and ecological crisis, nutrition-and-sustainability-related labels have been proliferating (Annunziata et al. 2019; Fenko et al., 2018), and information overload tend to confuse consumers (Mitchell & Papavassiliou, 1999). Moreover, adding a label to another on a same packaging increases the likelihood of presenting opposite-valence labels to consumers (e.g., a Nutri-Score A and an Eco-Score E). Therefore, despite their informing role, the profusion of labels may confuse consumers.

Combining several labels on a packaging, also called multi-labelling, is nowadays frequently observed, as it certainly provides advantages: it can increase the perceived value of a product (Dufeu et al., 2014) and therefore represents a competitive advantage for industrials. Plus, by displaying health-and-sustainability-related labels, multi-labelling is an opportunity for public-policy makers to encourage healthy and sustainable food purchases (De Bauw et al., 2021).

Unfortunately, not all eco-friendly products are healthy, and the other way around is also true. A plant-based meat is a sustainable alternative to meat that is not necessarily healthier (Curtain & Grafenauer, 2019); an avocado is an opposite example. How would consumers respond to labels that have different valences (i.e., one label is positively perceived, the other is not, like

a Nutri-Score A and an Eco-Score E)? Multiplying labels on the same packaging could, in this context, confuse consumers. If more retailers decide to strengthen the scoring practice or if public policy-makers make it compulsory, this situation may occur more frequently.

Consumer confusion is "a negatively valenced state of mind with emotional and cognitive components in which consumers lack comprehension or understanding of marketplace stimuli" (Fitzgerald et al., 2019, p. 308). Confusion can be general to food consumption or specific to a particular product. Consumer confusion is an issue for consumers, but it also represents a problem for various stakeholders: first, for public-policy makers, who usually aim at helping consumers get clearer information (e.g., Nutri-Score), and promoting a more sustainable consumption. For instance, the French government will launch an Eco-Score for clothing in 2024 (Da Sois, 2022). To cope with confusion, consumers indeed develop confusion-reduction strategies such as giving up on a purchase (Stanton & Paolo, 2012; Mitchell & Papavassiliou, 1997; Mitchell et al., 2005; Lu & Gursoy, 2015). Consumer confusion could therefore prevent sustainable behaviours, a completely counterproductive consequence. Second, consumer confusion is also an issue for companies, as it harms claims' effectiveness, product quality perception and firms' credibility (Fitzgerald et al., 2019).

Yet, in our current state of knowledge, only three studies (i.e., De Bauw et al., 2021; Sonntag et al., 2023; Potter et al., 2023) compared multi-labelling (e.g., a Nutri-Score and Eco-Score simultaneously presented) to single-labelling (e.g., a Nutri-Score or an Eco-Score). And only one study compared precisely the addition of an negative-valence label to a first positive-valence label, with a positive-valence label alone (i.e., Sonntag et al., 2023). Plus, these researchers measured willingness to pay but did not tackle other consumers' behaviours (i.e., consumer confusion, moral satisfaction). Therefore, we chose to compare two scorings with one scoring, and two similar valence scorings with two opposite valence scorings. This experimental setting studies the processes and identify the specific consequences of multi-labelling (VS single-labelling), as it highlights the impact of adding a second label and not merely what presenting two labels at the same time on a product induces. And we decided to measure other variables than willingness to pay, to explain more deeply consumers' behaviours towards multi-labelling. This is even more relevant as displaying at least one label has been increasingly common for industrials.

With this research, we aim at answering the following questions: how does multi-labelling impact consumers' ways of processing the information and behaviours? Do consumers process the information differently and take different purchasing decisions, when the two labels have

both a positive valence VS opposite valences (a positive and a negative one)? Does the individual's environmental consciousness impact the moral satisfaction that one can experience in case of two positive valence scorings?

In this paper, we explain the consequences of multi-labelling on purchase intentions with the concepts of moral satisfaction, which is the personal benefits one derives when contributing positively to certain causes (Andreoni, 1990, 1993) and consumer confusion. Following Kahneman's system theory (2011) (i.e., two systems can be used to process the information: system 1 analyzes information automatically, intuitively, and fast. System 2 uses effortful and slow mental processes to compute the information and generate evidence-based opinion about things), consumers could process multi-labelling differently, via either an automatic or a cognitive route, according to the valences of the scorings.

To answer these questions, we conducted a single factor randomized controlled online experiment, manipulating 3 conditions. We found that (1) multi-labelling can create two types of consumer confusion (i.e., general to food consumption and specific to the product), (2) that confusion does not necessarily impact consumers' purchase intentions, and (3) multi-labelling can be processed via two different routes (an automatic one and a cognitive one), according to the valence of the scorings.

We offer new insights on the research stream of multi-labelling by showing consumers' cognitive and behavioural reactions to a combination of Nutri-Score and Eco-Score, comparing multi-scoring of similar VS different valences, and multi-scoring VS single scoring. Plus, we extend the literature of consumer confusion. Finally, we will bring managerial contributions, relevant for managers and public policy makers, in a context of health and ecological crisis.

2. Literature review and conceptual framework

2.1. Labels as an information tool

Labels are signals (Brach et al., 2018) that can come from different sources (e.g., governments, NGOs, companies) and can be optional (e.g., the Nutri-Score in Europe) or not (e.g., a "warning" label regarding nutrition has been made compulsory for certain food products in Chile). Labels have two roles: first, they provide information about the quality of unobservable product attributes (Bauer et al., 2013). This way, they also aim at differentiating

products and emphasizing desirable product attributes (Golan et al., 2001). Second, labels provide consumers with simple heuristics to follow (Thøgersen & Nielsen, 2016), reducing complexity and choice overload. They help consumers manage uncertainty (Mitchell et al., 2005; Tonkin et al., 2016) and feel more confident about their choice (Chernev et al., 2015).

Sustainability labels (Stein & Lima, 2021) but also nutritional labels (Crockett et al., 2018) influence consumers' consumption choices. Specifically, Nutri-Score and Eco-score were proven efficient in encouraging consumers' healthier (De Temmerman et al., 2021) or eco-friendlier food choices (Weber, 2021) respectively.

We refer to Kahneman's system theory (2011) to explain the way labels are processed. Information processing goes through two systems: On the one hand, system 1 processes information automatically, intuitively, and fast, without any voluntary control and effort. It simplifies reality and therefore creates interference effects and biases (e.g., the halo effect, the Florida effect, or framing effects). A label is easy to read (Thøgersen & Nielsen, 2016) and understand (Grunert, 2007), it is processed automatically, and then, should be processed through system 1.

On the other hand, system 2 uses effortful and slow mental processes to compute the information and generate evidence-based opinion about things. "An active, coherence-seeking System 1 suggests solutions to an undemanding System 2" (Kahneman, 2011, p.103). In sum, system 1 is automatic and system 2 is deliberated. Moreover, in the situation of conflicting information, individuals process more the information to respond to an uncomfortable state. This mental effort is carried out through system 2 as it is the path when effortful process occurs (Kahneman, 2011). Conflicting labels, as conflicting information, would require more processing, using system 2. Consequently, labels are processed through system 1, but we assume they could be analyzed through system 2 in case of opposite-valence labels on same packaging.

2.2. Multi-labelling, a good idea?

Multi-labelling consists in combining several labels on a product, and no consensus on its effectiveness has been found yet.

Multi-labelling may not always be the best tool to raise purchase intentions. Combining a nutritional traffic-light with an environmental traffic-light has been shown less effective at increasing purchase intentions of ecological and healthy products, than a single label (Lacroix

et al., 2017). Similarly, sometimes combining a Nutri-Score with an Eco-Score increases purchase intentions for ecological products, but not more than a single Eco-Score (Potter et al., 2023).

Sirieix et al. (2013) explain the negative impact of multi-labelling: either consumers do not like any of the labels, or they perceive the association as contradictory. Contradiction can be of three types: (1) contradiction between labels' dimensions and associated values (e.g., sustainability as a collective interest, and health as an individual interest), (2) contradiction between the labels' content (e.g., fair-trade in developing countries and local) and (3) contradiction between labels' credibility (e.g., a certified label and a private brand label). Perceived contradictory combination of labels can engender mistrust, lack of understanding, caution and disinterest. Likewise, Lacroix et al. (2017) explained their results (i.e., absence of increase in purchase intentions in case of multi-labelling, comparing to single-labelling) with the phenomenon of consumer confusion.

Consumer confusion is "a negatively valenced state of mind with emotional and cognitive components in which consumers lack comprehension or understanding of marketplace stimuli" (Fitzgerald et al., 2019, p. 308). Among the food-related signals that consumers receive, there exist three main signals causing consumer confusion: overloading, similar and ambiguous information (Mick et al., 2004; Mitchell & Papavassiliou, 1999). When consumers face ambiguous information (e.g., dubious product claims such as "healthy", or conflicting information on a same product from different sources), they tend to infer product characteristics that are the not the actual ones, or be unclear about the product characteristics (Mayer et al., 1993).

The consequences of Consumer Confusion are manifold: cognitive, affective, behavioural and marketing (Chauhan & Sagar, 2021). Among them we find cognitive dissonance, affected information processing (Mitchell & Papavassiliou, 1999), decreased consumers' confidence decision (Chernev et al., 2015) and need for various things (price stability, brands, information, quality certifications, simplicity in shopping and governmental regulation) (Wobker et al., 2015). There are also consumers' dissatisfaction (Langer et al., 2008), and loose of trust in the product, loose of trust in the product provider (Mitchell & Papavassiliou, 1999), loose of trust in the product competence, integrity and benevolence (Foxman et al., 1992) and loose of trust in the marketplace (Morgan & Hunt, 1994). Finally, we also find negative word-of-mouth (Turnbull et al., 2000), harmed labels' informativeness (Harbaugh et al., 2011), decision postponement and disloyalty (Walsh et al., 2007), abandon of purchase (Wobker et al., 2015),

and irrational purchase decision (Mitchell & Papavassiliou, 1999). We distinguish general confusion from specific confusion, the former being general to food consumption while the latter being particular to a product.

To conclude, to the state of our knowledge, little research has investigated multi-labelling in comparison with single-labelling (De Bauw et al., 2021; Lacroix et al., 2017; Potter et al., 2023), and no study has tackled opposite-valence (i.e., conflicting) labels in comparison with similar-valence labels. Plus, even if the concept of consumer confusion (or similar concepts such as contradictory information) has been evoked as potential explanation to the ineffectiveness of multi-labelling (Lacroix et al., 2017; Sirieix et al., 2013), there remains to be determined empirically.

2.3. Conceptual model

We saw that multi-labelling seems to be controversial as it could trigger confusion (Lacroix et al., 2017), which could impact purchase intentions (Wobker et al., 2015). Therefore we hypothesize:

H1: An indirect effect of adding an Eco-Score with a negative valence to a Nutri-Score with a positive valence, compared to displaying a Nutri-Score with a positive valence only, will lower purchase intention through an increase in confusion (general to food consumption and specific to the product).

As previously mentioned, conflicting information is processed through system 2 (Kahneman, 2011), therefore, if we validate this first hypothesis, we could state that this route is processed through system 2.

However, multi-labelling can sometimes be beneficial to consumers, industrials, and public-policy makers. When it comes to consumers, this can be explained by moral satisfaction. Indeed, people experience moral satisfaction when they contribute to certain causes (Andreoni, 1990, 1993). For instance, eating ethical food (such as a fair-trade product) generates moral satisfaction, and raises the tastiness and purchase intention of this food (Bratanova et al., 2015). Therefore, moral satisfaction could explain why multi-labelling can create greater value for a product, in case of a combination of an organic and a fair-trade label for example (Dufeu et al., 2014). Plus, moral satisfaction can be moderated by individuals' values, precisely: altruism (Bratanova et al., 2015). As altruism is positively associated with environmental concern (Xu et al., 2021), we hypothesize that the most environmentally concerned individuals would

experience moral satisfaction more than other individuals. Moreover, since an Eco-Score is an altruistic-oriented label (i.e., it represents a collective interest, protecting the planet) it can trigger moral satisfaction in case of a positive valence. Thus, we hypothesize:

H2: An indirect effect of adding an Eco-Score with a positive valence to a Nutri-Score with a positive valence, compared to a Nutri-Score with a positive valence alone, on purchase intentions, through moral satisfaction, is moderated by environmental concern, such as the higher the environmental concern, the higher moral satisfaction and purchase intentions.

Plus, moral satisfaction can engender a halo effect (e.g., it gives rise to higher taste expectations, Bratanova et al., 2015), which indicates that moral satisfaction does not require any particular extensive cognitive process. Therefore, we can state that moral satisfaction is processed through system 1. Consequently, if our second is validated, we can conclude that this route is processed through system 1.

Figure 1 depicts our conceptual framework.

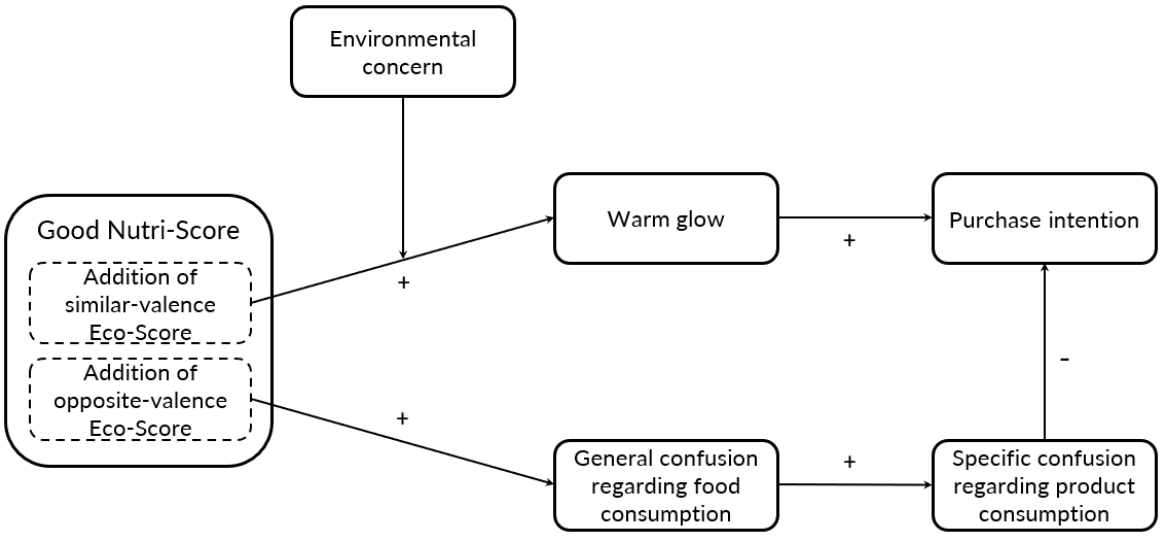

Fig.1. Conceptual framework

3. Method

3.1. Study design

We conducted a single-factor randomized controlled online experiment, manipulating 3 conditions (i.e., a control condition vs. a similar-valence scoring condition vs. an opposite-

valence scoring condition). We chose two scorings, i.e., the Nutri-Score and the Eco-Score. The Nutri-Score has emerged as the best control condition as it is nowadays known by most consumers in European countries (Ducrot et al., 2016; De Temmerman et al., 2021), and thus, it is more logical to add the new Eco-Score to the Nutri-Score, than the other way around. Concretely, the control condition consisted in the display of a positive-valence Nutri-Score only (i.e., Nutri-Score A). In the similar-valence scoring condition, a positive-valence Eco-score (i.e., Eco-Score B) was displayed with the Nutri-Score A, whereas in the opposite-valence scoring condition, a negative-valence Eco-score (i.e., Eco-Score E) was shown with the Nutri-Score A.

In line with previous research (e.g., De Bauw et al., 2021; Potter et al., 2023), we placed participants in a shopping context: we invited them to consider the purchase of a piece of fish. We chose this product because it is commonly consumed in the European Union (the average fish consumption per capita reached 24kg in 2018 according to EUMOFA, 2020); and is plausible for our experiment (fish can be correctly associated with a Nutri-Score A, and with a large scope of Eco-Score, including Eco-Score B and Eco-Score E). Our stimuli include the picture and the price of the product, the name of the fish, the weight, the scoring(s) and a fake brand, as inspired by real-life practices. See below figure 2 wich shows the three conditions:

Fig. 2. The three experimental conditions

3.2. Procedure

Consent was explicitly asked, and anonymity was guaranteed at the very beginning of the questionnaire. The study received ethical approval of the Université catholique de Louvain research ethics committee.

After a filter question to ensure that participants buy fish at least occasionally, they had to imagine that they were shopping in a store or on the website of their usual store, and looking for fish. We then randomly exposed them to 1 of the 3 experimental stimuli and asked them to consider carefully the information provided. We asked them to indicate their purchase intentions of the presented fish, using 2 items Likert scale (i.e., *I would buy this piece of fish, I would recommend this fish to someone who asks my advice*) from Martin & Bush (2000).

We then measured general confusion (i.e., confusion regarding food consumption in general) and specific confusion (i.e., confusion when it comes to choosing a piece of fish) using respectively 3 and 4 items from Walsh et al. (2007). We chose to measure general confusion before specific confusion to avoid a potential influence on the reported specific confusion on general confusion. Then, we measured the perceived conflict between the provided information using 3 ad hoc items adapted from Chang (2015) to be used as a manipulation check. Indeed, by making sure that respondents would perceive the conflict when facing a negative-valence scoring and a positive-valence scoring, and not any conflict in the two other conditions, we would confirm that perceived conflict would arise from the conflicting scorings (i.e., successful manipulation). In addition, we measured moral satisfaction using 3 items from Bratanova et al. (2015). We also measured participants' age and gender to use them as covariates along with fish consumption (from "never" to "very regularly") and environmental concern, using 3 items from Iqbal et al. (2021).

All questions used 7-point Likert scales to assess the focal constructs. Appendix 2 provides all scale items, as well as their measured construct reliability and average variance extracted.

3.3. Participants

The data collection involved 215 participants recruited from the online panel of a marketing research institute. After removing the participants who failed the attention check and those whose responses were considered unreliable (they answered the whole survey in less than 160 seconds), 167 respondents were considered for the analyses (47.3% women; mean age = 44 years). Male and female were equally distributed across conditions, the average age was 27. Respondents did not differ in terms of age ($F_{(2,164)} = .10$, ns), gender ($\chi_{(2)} = .51$, ns), fish consumption ($F_{(2,164)} = .79$, ns) or environmental concern ($F_{(2,164)} = .12$, ns) across the three

experimental conditions. Additionally, we measured the perceived conflict between the information provided using 3 ad hoc items adapted from Chang (2015) to be used as a manipulation check.

4. Results

Respondents perceived the information provided as significantly more conflictual in the opposite-valence scoring condition than in the control condition (M = 2.89 vs. M = 2.34, t = 1.915, p < .05). However, no difference in perceived conflict appeared between the similar-valence scoring condition and the control condition (M = 2.62 vs. M = 2.34, t = 1.09, ns). This suggests successful manipulation.

Controlling for the respondents' age, gender, fish consumption and environmental concern, ANCOVAs show that adding an opposite-valence scoring to a first scoring (compared to a positive-valence scoring alone) significantly increases both respondents' general confusion regarding food consumption (M = 4.46 vs. M = 5.02, F(1,102) = 4.32, p = .02) and specific confusion regarding fish consumption (M = 4.15 vs. M = 4.47, F(1,102) = 3.05, p = .04), but has no influence on purchase intention (F(1,102) = .21, ns). To test the mediating influence of general confusion between opposite-valence scorings and specific confusion (i.e., the cognitive route), we conducted a mediation analysis using the recommended indirect bootstrapping procedure (SPSS Macro Process Model 6, 5.000 bootstrap samples; Hayes, 2012). Controlling for the same variables as previously, the analysis shows that opposite-valence scorings significantly increase general confusion (a = .61, p = .02), which, in turn, increases specific confusion (b = .45, p = .00). This does not extend to purchase intention (c = -.08, ns). The mediating effect of general confusion between opposite-valence scorings and specific confusion regarding fish consumption is significant (the confidence interval [.0215; .5992] excludes the value 0) and total, since the direct effect of opposite-valence scorings on specific confusion is non-significant. These findings corroborate the existence of a cognitive route when an opposite-valence scoring is added to a positive-valence scoring . To go further on this cognitive route, it is interesting to note that this combination has no influence on purchase intention, neither directly (M = 5.78 vs. M = 5.89, F(1,102) = .22, ns) nor through any type of confusion (SPSS Macro Process Model 6, 5.000 bootstrap samples; Hayes, 2012).

Turning to the test of the automatic route, we conducted a moderated mediation analysis using the recommended indirect bootstrapping procedure (SPSS Macro Process Model 7, 5.000 bootstrap samples; Hayes, 2012). Controlling for the same variables as previously, the analysis

shows an interaction effect between the similar-valence scorings and respondents' environmental concern (a = .20, p = .02), such that the addition of a similar-valence scoring to a positive-valence scoring only increases moral satisfaction among respondents scoring high on environmental concern (Johnson-Neyman = 5.87). In turn, moral satisfaction increases ecology-conscious consumers' purchase intentions. The moderated mediation is significant (the confidence interval [.0128; .2225] excludes the value 0) and total, since the direct effect of the similar valence scorings on purchase intention is non-significant (p = .42). These findings corroborate the existence of an automatic route when displaying a similar-valence scoring to a Nutri-Score A.

5. Discussion

The present research aimed at investigating the impact of multi-labelling (via the addition of an Eco-Score B or E to a Nutri-Score A) on food consumer behaviours. We found a positive relationship between the addition of an Eco-Score B to a Nutri-Score A and moral satisfaction, moderated by individuals' environmental concern, but this does not extend to increasing purchase intentions. We showed a positive relationship between adding an Eco-Score E to a Nutri-Score A and general consumer confusion, mediated by specific consumer confusion. However, this mediation does not impact purchase intentions.

First, we extend previous research on multi-labelling (e.g., De Bauw et al., 2021; Sonntag et al., 2023; Potter et al., 2023) by comparing multi-scoring with one scoring, and opposite-valence scorings with similar-valence scorings. We integrate other concepts (i.e., moral satisfaction and consumer confusion), as well as other literatures (i.e., information processing) in the multi-labelling research.

We first show that two positive-valence scorings increase moral satisfaction for the most environmentally conscious consumers. Then we demonstrate that two opposite-valence scorings (a Nutri-Score A and an Eco-Score E) provoke general and specific confusion. Interestingly, in none of the situations did multi-labelling significantly influence purchase intentions. This absence of consequences on purchase intentions nuances De Bauw et al. (2021)'s results, as they found an increase in purchase intentions for highly nutritious food. However, we also complete their findings as they did not find an increase of purchase intentions for eco-friendly food in case of multi-labelling. Furthermore, we corroborate the findings of Potter et al. (2023) which indicate that combining a Nutri-Score and an Eco-Score has no

impact, either positive or negative, on purchase intention for sustainable or healthy products, compared to a single scoring (Nutri-Score or Eco-Score). Finally, we add a fourth contradiction type to the list of Sirieix et al. (2013) by establishing that opposite-valence scorings are a conflicting type of multi-labelling.

Second, we build on information processing theory, and particularly on Kahneman's system theory (2011) by showing that similar-valence scorings stimulate the automatic processing route (system 1) through moral satisfaction, while conflicting scorings stimulate the cognitive processing route (system 2) through general and specific confusion. Multi-labelling is therefore processed differently according to the valences of scorings.

Third, we extend the literature on consumer confusion by showing that, (1), multi-labelling can be an antecedent of different types of consumer confusion, (2), this confusion does not necessarily impact consumers' purchase intentions, and this process should be further investigated.

We develop several explanations to our results: on the one hand, the fact that two positive-valence scorings do not impact purchase intentions may be due to the Nutri-Score A which already brought about high purchase intentions. This explanation could not have been made if we had not compared multi-labelling with only one scoring.

On the other hand, the fact that two opposite-valence scorings do not impact purchase intentions could be explained by a coping mechanism: as consumers are confused when the scorings have different valences (i.e., conflicting information), we can assume that consumers would have coped with confusion by using a heuristic, such as "as I'm confused and don't know what to do, I will favour my health and buy this product even so". Therefore, there would exist a trade-off in favour of the Nutri-Score, despite the important role the Eco-Score plays in food choices (De Bauw et al., 2022b). Indeed, consumers' food choices include trade-offs between different attributes such as price, taste, or nutritional content (De Bauw, 2022b), that sometimes lead to sacrifice some benefits (Alba et al., 1997). In particular, research showed that consumers may trade-off environmental benefits against individual benefits (Macdiarmid et al. 2021). Similarly, De Bauw et al. (2021) also explained their results (i.e., combining a Nutri-Score and an Eco-Score does not improve purchase intentions for products with high Eco-Scores) with the assumption that considering two scorings is too burdensome and gives rise consumers to focus only on the Nutri-Score.

Finally, by showing that general confusion is a predictor of specific confusion, we highlight the existence of a consequence of general confusion, meaning that being confused regarding food consumption in general raises the likelihood of being confused in front of the fish product. Other consequences of general confusion could be investigated.

Consequently, to offer recommendations for public authorities and managers respectively, we certainly encourage the adoption of scorings as this implicitly leads producers to strive for always better scorings. Indeed, when products are well-rated, they certainly present a competitive advantage that can make companies' sales increase and encourage consumers to turn towards healthier and eco-friendlier products (De Temmerman et al., 2021; Weber, 2021). In addition, the positive impact of scorings on sales would encourage other manufacturers to improve or develop products with high ratings. However, we do not recommend scorings to be made mandatory because it may raise the probability of displaying opposite scorings, which would be confusing and could have a counterproductive effect, like the trade-off between health and the environment. Indeed, consumers tend to favour their health over environmental benefits when they face such a dilemma (Macdiarmid et al. 2021). In that context, a systematic preference for health could be expected in case of confusion, whereas scorings are aimed at making consumers consider both.

Regarding future research: we studied multi-labelling when labels refer to two different domains (health and the environment), we hypothesized that the absence of consequences of confusion on purchase intentions was due to a trade-off between health and the environment. Therefore, in a situation of multi-labelling with labels referring to the same domain, the trade-off would be less likely to occur (even if it could still exist if consumers favor one label over another, which we would control). A new study would confirm or infirm these hypotheses, as we would investigate multi-labelling when labels refer to the same domain. We precise that conflicting labels withing a same domain could exist. Indeed, the presence of scorings such as Nutri-Score and Eco-Score increases this likelihood, as they rely on scientific calculations, when some claims or labels are not always reliable. For example, the Haute Valeur Environmental label is supposed to certify the ecological practices of a company but it appears to be controversial, therefore, it could be combined with a bad Eco-Score. Another example could be the combination of a nutrition claim with a Nutri-Score E.

We acknowledge some limits: respondents probably processed the Nutri-Score before the Eco-Score as the former is above the latter, which makes it likely that they would have paid more

attention to the Nutri-Score. The experimental method implies that external factors that could impact consumers' behaviours are not considered. Finally, our sample size could be bigger to strengthen our results.

Conclusion:

To conclude, multi-labelling is likely to be increasingly used by industrials in the future, which raises questions about its effectiveness and relevance, notably in a context of high food consumption confusion. We state that multi-labelling (through the addition of an Eco-Score B or E to a Nutri-Score A) is a double-edged sword, that can raise moral satisfaction for ecology-conscious consumers, in case of two-positive-valence scorings, via an automatic route; but that can also create confusion if scorings have opposite valences, via a cognitive route. We encourage manufacturers and public policy makers to implement these types of scorings, as consumers are eager to be informed about food attributes. However, we would advise them to be careful and to avoid displaying confusing information (through opposite-valence scorings), as confusion could be detrimental to sustainable and healthy behaviours.

Acknowledgements: this research was funded by the Entreprendre.wapi Chair in food consumer behaviours. The funders had no role in the study design, data collection, analysis, or interpretation. No conflict of interests is declared by the authors. The authors contributed equally to the work, and all approve of the final article.

References

Alba, J., Lynch, J., Weitz, B., Janiszewski, C., Lutz, R., Sawyer, A., & Wood, S. (1997). Interactive home shopping: consumer, retailer, and manufacturer incentives to participate in electronic marketplaces. *Journal of marketing*, *61*(3), 38–53.

Alba-Juez, L. (2021). Fast and slow thinking as secret agents behind speakers'(un) conscious pragmatic decisions and judgements. *Journal of Pragmatics*, *179*, 70–76.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal*, *100*(401), 464–477.

Andreoni, J. (1993). An Experimental Test of the Public-Goods Crowding-Out Hypothesis. *The American Economic Review*, *83*(5), 1317–1327.

Annunziata, A., Mariani, A. & Vecchio, R. (2019). Effectiveness of sustainability labels in guiding food choices: Analysis of visibility and understanding among young adults. *Sustainable Production and Consumption*, *17*, 108–115.

Askew, K. (2021) *Eco-Score's European Expansion: Lidl and Colruyt adopt environmental footprint labelling*, Food Navigator (Eco-Score's European expansion : Lidl and Colruyt adopt environmental footprint labelling (foodnavigator.com)).

Bauer, H. H., Heinrich, D., & Schäfer, D. B. (2013). The effects of organic labels on global, local, and private brands: More hype than substance? *Journal of Business Research*, *66*(8), 1035–1043.

Bishop, J., Thomas, J., Ahmed, S., Boylan, S., and Andonopoulos, V. 2022. Communicating Food Sustainability to Consumers: Towards more effective labelling. One Planet Network and WWF.

Brach, S., Walsh, G., & Shaw, D. (2018). Sustainable consumption and third-party certification labels: Consumers' perceptions and reactions. *European Management Journal*, *36*(2), 254–265.

Bratanova, B., Vauclair, C. M., Kervyn, N., Schumann, S., Wood, R., & Klein, O. (2015). Savouring morality. Moral satisfaction renders food of ethical origin subjectively tastier. *Appetite, 91*, 137–149.

Bryant, C. J. (2022). Plant-based animal product alternatives are healthier and more environmentally sustainable than animal products. *Future Foods*, 100174.

Chang, C. (2015). Motivated processing: How people perceive news covering novel or contradictory health research findings. *Science Communication, 37*(5), 602–634.

Chernev, A. Böckenholt, U. Goodman J. (2015). Choice overload: A conceptual review and meta-analysis. *Journal of Consumer Psychology, 25*(2), 333–358.

Crockett, R. A., King, S. E., Marteau, T. M., Prevost, A. T., Bignardi, G., Roberts, N. W., ... & Jebb, S. A. (2018). Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption. *Cochrane Database of Systematic Reviews*, (2).

Curtain, F., & Grafenauer, S. (2019). Plant-based meat substitutes in the flexitarian age: an audit of products on supermarket shelves. *Nutrients*, *11*(11), 2603.

Da Sois, J. (2022). *Environnement : à quoi ressemblera le futur « éco-score » pour les vêtements ?* Le Figaro (https://www.lefigaro.fr/conso/environnement-a-quoi-ressemblera-le-futur-eco-score-pour-les-vetements-20221125)

De Bauw, M., Matthys, C., Poppe, V., Franssens, S., & Vranken, L. (2021). A combined Nutri-Score and 'Eco-Score'approach for more nutritious and more environmentally friendly food choices? Evidence from a consumer experiment in Belgium. *Food quality and preference, 93*, 104276.

De Bauw, M., De La Revilla, L. S., Poppe, V., Matthys, C., & Vranken, L. (2022). Digital nudges to stimulate healthy and pro-environmental food choices in E-groceries. Appetite, *172*, 105971.

De Bauw, M., Franssens, S., & Vranken, L. (2022b). Trading off environmental attributes in food consumption choices. *Food Policy, 112*, 102338.

De Temmerman, J., Heeremans, E., Slabbinck, H., & Vermeir, I. (2021). The impact of the Nutri-Score nutrition label on perceived healthiness and purchase intentions. *Appetite*, *157*, 104995.

Dinçer, M. A. M., Arslan, Y., Okutan, S., & Dil, E. (2023). An inquiry on organic food confusion in the consumer perception: a qualitative perspective. British Food Journal, *125*(4), 1420–1436.

Ducrot, P., Julia, C., Méjean, C., Kesse-Guyot, E., Touvier, M., Fezeu, L. K., Hercberg, S., & Péneau, S. (2016). Impact of Different Front-of-Pack Nutrition Labels on Consumer Purchasing Intentions: A Randomized Controlled Trial. *American journal of preventive medicine*, *50*(5), 627–636.

Dufeu, I., Ferrandi, J.-M., Gabriel, P., & Le Gall-Ely, M. (2014). Socio-environmental multi-labelling and consumer willingness to pay. *Recherche et Applications En Marketing (English Edition)*, *29*(3), 35–56.

European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) (2020). *Le marché européen du poisson.* European Commission.

Fenko, A., Nicolaas, I., & Galetzka, M. (2018). Does attention to health labels predict a healthy food choice? An eye-tracking study. *Food quality and preference*, *69*, 57–65.

Fitzgerald, M. P., Donovan, K. R., Kees, J., & Kozup, J. (2019). How confusion impacts product labeling perceptions. *Journal of Consumer Marketing*, *36*(2), 306–316.

Food and Agriculture Organization of the United Nations (2001), "Codex General Standard for the Labelling of Prepackaged Foods," https://www.fao.org/3/y2770e/y2770e02.htm.

Garaus, M., Wagner, U., & Kummer, C. (2015). Cognitive fit, retail shopper confusion, and shopping value: Empirical investigation. *Journal of Business Research*, *68*(5), 1003–1011.

Gass, R. H., & Seiter, J. S. (2014). *Persuasion, social influence, and compliance gaining* (Fifth edition). Pearson.

Gérard, M. (2023) : *« Nutri-score : 320 scientifiques pressent la Commission européenne de ne pas renier ses engagements sur l'étiquetage nutritionnel* » Le Monde.

https://www.lemonde.fr/planete/article/2023/05/11/nutri-score-320-scientifiques-pressent-la-commission-europeenne-de-ne-pas-renier-ses-engagements-sur-l-etiquetage-nutritionnel_6172896_3244.html

Godden, E., Thornton, L., Avramova, Y., & Dens, N. (2023). High hopes for front-of-pack (FOP) nutrition labels? A conjoint analysis on the trade-offs between a FOP label, nutrition claims, brand and price for different consumer segments. *Appetite*, *180*, 106356.

Golan, E., Kuchler, F., Mitchell, L., Greene, C., & Jessup, A. (2001). Economics of Food Labeling. *Journal of Consumer Policy*, *24*(2), 117–184.

Grunert, K. G., & Wills, J. M. (2007). A review of European research on consumer response to nutrition information on food labels. *Journal of public health*, *15*, 385–399.

Grunert, K.G (2011). Sustainability in the food sector: A consumer behaviour perspective. *International Journal of food system dynamics*, *2*(3), 207–218.

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling.

Hercberg, S., Touvier, M., & Salas-Salvado, J. (2021). The Nutri-Score nutrition label. *International Journal for Vitamin and Nutrition Research*, 1–11.

Hollands, G. J., Bignardi, G., Johnston, M., Kelly, M. P., Ogilvie, D., Petticrew, M., Prestwich, A., Shemilt, I., Sutton, S., & Marteau, T. M. (2017). The TIPPME intervention typology for changing environments to change behaviour. *Nature Human Behaviour*, *1*(8), 0140.

Iqbal, J., Yu, D., Zubair, M., Rasheed, M. I., Khizar, H. M. U., & Imran, M. (2021). Health consciousness, food safety concern, and consumer purchase intentions toward organic food: The role of consumer involvement and ecological motives. *Sage Open*, *11*(2), 21582440211015727.

Kahneman, D. (2011). *Thinking, fast and slow*, Macmillan.

Lacroix, A. (2017). Quand simple plus simple devient complexe : l'impact de la juxtaposition de logos nutritionnels et environnementaux sur les décisions d'achat. *Actes du congrès.*

Langer, A., Eisend, M., & Kub, A. (2008). The impact of eco-labels on consumers: Less information, more confusion? *European Advances in Consumer Research, 8*, 338–339

Lu, A. C. C., & Gursoy, D. (2015). A conceptual model of consumers' online tourism confusion. *International Journal of Contemporary Hospitality Management*,

Macdiarmid, J. I., Cerroni, S., Kalentakis, D., & Reynolds, C. (2021). How important is healthiness, carbon footprint and meat content when purchasing a ready meal? Evidence from a non-hypothetical discrete choice experiment. *Journal of Cleaner Production, 282*, 124510.

Martin, C. A., & Bush, A. J. (2000). Do role models influence teenagers' purchase intentions and behavior?. *Journal of consumer marketing, 17*(5), 441–453.

Mayer, R. N., Scammon, D. L., & Golodner, L. F. (1993). Healthy confusion for consumers. *Journal of Public Policy & Marketing, 12*(1), 130–132.

Mitchell, V. W., & Papavassiliou, V. (1997). Exploring consumer confusion in the watch market. *Marketing Intelligence & Planning, 15*(4), 164–172.

Mitchell, V. W., & Papavassiliou, V. (1999). Marketing causes and implications of consumer confusion. *Journal of Product & Brand Management, 8*(4), 319–342.

Mitchell, V.-W., Walsh, G., & Yamin, M. (2005). Towards a conceptual model of consumer confusion. *Advances in Consumer Research, 32*(1), 143–150.

Nutri-Score (2022). Santé Publique France (Nutri-Score (santepubliquefrance.fr)).

Pistorius, M. & Foot, N. (2021*): "Eco-score makes its entry in EU's front-of-pack labelling debate"* Euractiv. Eco-score makes its entry in EU's front-of-pack labelling debate – EURACTIV.com

Potter, C., Pechey, R., Cook, B., Bateman, P., Stewart, C., Frie, K., ... & Jebb, S. A. (2023). Effects of environmental impact and nutrition labelling on food purchasing: An experimental online supermarket study. *Appetite, 180*, 106312.

Rozin, P., & Cohen, A. B. (2003). High frequency of facial expressions corresponding to confusion, concentration, and worry in an analysis of naturally occurring facial expressions of Americans. *Emotion, 3*(1), 68–75.

Sirieix, L., Delanchy, M., Remaud, H., Zepeda, L., & Gurviez, P. (2013). Consumers' perceptions of individual and combined sustainable food labels: a UK pilot investigation. *International Journal of Consumer Studies*, *37*(2), 143–151.

Sonntag, W. I., Lemken, D., Spiller, A., & Schulze, M. (2023). Welcome to the (label) jungle? Analyzing how consumers deal with intra-sustainability label trade-offs on food. *Food Quality and Preference*, 104, 104746.

Stanton, J. V., & Paolo, D. M. (2012). Information overload in the context of apparel: Effects on confidence, shopper orientation and leadership. *Journal of fashion marketing and management: an international journal*, *16*(4), 454–476.

Stein, A. J., & de Lima, M. (2022). Sustainable food labelling: considerations for policy-makers. *Review of Agricultural, Food and Environmental Studies*, *103*(2), 143–160.

Thøgersen, J. (2000). Psychological determinants of paying attention to eco-labels in purchase decisions: Model development and multinational validation. *Journal of consumer policy*, *23*(3), 285–313.

Thøgersen, J., & Nielsen, K. S. (2016). A better carbon footprint label. *Journal of Cleaner Production*, *125*, 86–94.

Tonkin, E., Coveney, J., Meyer, S. B., Wilson, A. M., & Webb, T. (2016). Managing uncertainty about food risks–consumer use of food labelling. *Appetite*, *107*, 242–252.

Torma, G., & Thøgersen, J. (2023). Can a meta sustainability label facilitate more sustainable consumer choices?. *Business Strategy and the Environment*,

Walsh, G., Hennig-Thurau, T., & Mitchell, V. W. (2007). Consumer confusion proneness: scale development, validation, and application. *Journal of Marketing Management*, *23*(7–8), 697–721.

Weber, A. (2021). Mobile apps as a sustainable shopping guide: The effect of eco-score rankings on sustainable food choice. Appetite, *167*, 105616.

Xu, Y., Li, W., & Chi, S. (2021). Altruism, environmental concerns, and pro-environmental behaviors of urban residents: a case study in a typical Chinese city. *Frontiers in Psychology*, *12*, 643759.

Appendix 1: Experimental stimuli

Control condition	 Cod fillets « *The old fisherman*» +- 300g € 19/kg 
Addition of a good Eco-Score	 Cod fillets « *The old fisherman*» +- 300g € 19/kg  
Addition of a bad Eco-Score	 Cod fillets « *The old fisherman*» +- 300g € 19/kg  

Appendix 2: Measurement scales (confirmatory factor analysis)

Variable	***Measurement items***	***Factor loadings (CFA)***	***α (ρ)***	***AVE***
General confusion regarding food consumption	It is more and more complicated to identify good food products	.870	.867 (.919)	.791
	It's getting harder and harder to find your way around food products	.937		
	There is so much information on food products that one can feel more and more lost	.859		
Specific confusion regarding product consumption	It's hard to identify the right choice in fish	.774	.830 (.887)	.659
	It's hard to tell the difference between fish	.845		
	There are so many choices in fish that you can feel lost	.823		

	It's hard to know which fish to choose	.803		
moral satisfaction	By buying this fish, I feel I am doing something morally right	.782	.830 (.887)	.714
	By buying this fish, I feel like a better person	.849		
	By buying this fish, I feel like I am personally contributing to something better	.900		
Environmental concern	It is very important to me that the food has been prepared in an environmentally friendly way	.925	.920 (.949)	.861
	It is very important to me that the food is packaged in an environmentally friendly way	.933		
	It is very important to me that the food has been produced in a way that does not disturb the balance of nature	.927		
Perceived conflict in the information provided	The information on this fish is conflicting	.921	.902 (.938)	.835
	The information on this fish is in opposition	.927		
	The information on this fish is not consistent	.894		
Purchase intention	I would recommend this fish to someone who asks my advice	.909	.829 (.921)	.853
	I would buy this piece of fish	.937		