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RESEARCH ARTICLE

What's in it for Consumers: Does the Legal Assumption of 'the Average Consumer' Reading the List of Ingredients Actually Protect Consumers Against Misleading Food Packaging?

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Article History

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consumer protection, consumer behaviour, food packaging, misleading food information, Teekanne-case

Abstract

The main assumption in legal decisions on misleading food packaging is that consumers read the list of ingredients when purchasing food products (CJEU *Teekanne*). This study examines whether this assumption reflects actual consumer behaviour in a supermarket context. Specifically, it investigates whether the number of choice options (few vs. many), consumers' Need for Cognition (NfC), and purchase intention (healthy vs. tasty product) influence consumers' reading and remembering ingredient lists. Participants (n = 379) took part in a 2x2 experimental design, manipulating the number of yoghurt package options (two vs. five) and purchase task (healthy vs. tasty), along with a pre-test and a post-test. The study recorded the duration and frequency of participants' attention to the ingredient list, their recall of the ingredients, and the influence of NfC on these behaviours. Results show that participants exposed to two packages (vs. five packages) and participants with high NfC (vs. low NfC) looked at the ingredient list significantly more frequently. Although participants tasked with choosing a healthy product looked at the ingredient list more often than those tasked with choosing a tasty product, this difference was not statistically significant. The findings suggest that the legal assumption that the "average consumer" reads the ingredient list when purchasing food products conflicts with actual consumer behaviour. The results indicate the importance of reconsidering this legal assumption, given (1) different information needs of consumers (NfC), (2) the context of supermarkets offering numerous choices, and (3) differing purchase intentions of consumers when buying food products.

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1 Introduction

Obesity and overweight are significant health and social problems that have reached pandemic levels, with 53% of EU's adult population estimated to be overweight (Eurostat, 2021). One contributing factor is an obesogenic environment where the food industry misleads consumers with packaging that does not accurately reflect the food ingredients (BEUC 2018; Anderson Steeves et al. 2014). Examples include vitamin water with high amounts of sugar and crab salad without any crab. EU legislation prohibits such misleading food packaging to ensure consumers can make informed choices aligned with their health, economic, environmental, social, and ethical considerations (Art. 8:1c and 16 Directive 178/2002; art. 7, recital 2, and recital 3 Regulation 1169/2011). However, misleading packaging is widely acknowledged as a major problem in the EU (European Parliament 2012, 15; BEUC 2018, 17).

In the *Teekanne* case the European Court of Justice (CJEU) decided that, although other elements of food packaging could be relevant in determining whether it is misleading, the main assumption is that the list of ingredients determines consumers´ expectations about the food product. On the one hand, this assumption is understandable since the list of ingredients, which includes all the components of the food, is mandatory on food packaging (art. 18 Regulation 1169/2011) to ensure the provision of accurate information to consumers. On the other hand, behavioural science research indicates that the assumption that consumers read the list of ingredients does not align with their actual buying behaviour (Grunert & Wills 2007; De Jager & Verheij 2019; Timmerman & Piqueras-Fiszman 2019). Therefore, the current legal assumption may not be adequate in protecting consumers against misleading food packaging. Indeed, packaging layout (e.g., pictures or visual elements) not in line with the list of ingredients may cause consumers to purchase food products based on incorrect information, as this impression will not always be corrected by consulting the list of ingredients.

Since the European Commission acknowledges the relevance of behavioural science for law-making and court decisions (European Commission 2016, 40, 53; European Commission 2012, 4-5, 12, 16; European Commission 2009, 31), we conducted a study to explore whether the legal assumption that consumers use the list of ingredients when making food choices reflects their actual behaviour, and under what conditions. The results of the study aim to improve EU legislation and may offer insights for courts tasked with evaluating the misleading nature of packaging. This may contribute to protecting consumers against what is actually misleading them. Additionally, the study explores whether the legal ´average consumer´-norm is in line with the real consumer, so that consumers can make informed and healthy food choices. Thus, the study aims to contribute to the achievement of the goals of EU legislation prohibiting misleading food packaging (Regulation 1169/2011, recitals 2 and 3). Furthermore, by investigating the role of the list of ingredients in consumers' decision-making process, the study contributes to the existing literature on consumer decision-making, which shows that visual information on packaging generally plays a more prominent role than textual information (Childers & Houston 1984; Wang 2013). The current study also provides insight into factors potentially influencing this.

Hereinafter, the Second Section outlines the legal framework regarding misleading food packaging. Section Three provides an overview of the behavioural science literature on food packaging and consumer decision-making. Building on this legal framework and the behavioural science research, Section Four describes our experiment on the role of ingredient lists in consumer food decisions. Specifically, the study examines whether the choice context (many or few choice options), consumers' need for cognition (*NfC),* and their purchase

intentions (healthy vs. tasty) affect their likelihood of reading and remembering the ingredient list. Section Five presents the results of the experiment. Finally, Section Six discusses the results and their potential legal implications.

2 Legal Framework

2.1 Legislation and Self-Regulation

In general, the framework on misleading food packaging consists of three layers:

1. Legislation on the protection of consumers against unfair commercial practices under the Unfair Commercial Practices Directive (UCPD: Directive 2005/29/EC).
2. Legislation on providing food information to consumers under the Food Information to Consumers Regulation (FIC: Regulation 1169/2011).
3. Self-regulation at international and national levels, such as the ICC-Advertising and Marketing Communications Code (ICC-Code, 2018).

The UCPD prohibits unfair business-to-consumer commercial practices. A commercial practice is deemed unfair if it materially distorts the economic behaviour of the average consumer regarding a product (art. 5:2 under b). A commercial practice is considered misleading if it involves false information or deceives an average consumer about, inter alia, the main characteristics of the product (art. 6:1). The CJEU in *Gut Springenheide* (1998, at 31) defined an "average consumer" as reasonably well-informed and reasonably observant and circumspect.

Regarding food information (e.g. the packaging), article 7 FIC prohibits misleading information, particularly as to the characteristics, effects, or properties of the food. In general, food information must be accurate, clear and easy to understand for consumers.

In addition to European and national legislation, international and national self-regulation also prohibit misleading food packaging. Internationally, the ICC-Code serves as a globally applicable self-regulatory framework, developed by experts from various industry sectors worldwide. According to Article 5 of the Code, marketing communications should be truthful and not misleading, particularly, but not exclusively, regarding the characteristics of the product. Furthermore, the Code stipulates that marketing communications should be legal, decent, honest, and truthful (Article 1 ICC Code).

2.2 *Teekanne*-Case

Section 2.1 makes clear that the legal framework on misleading food packaging mainly contains open norms. Therefore, it is relevant to briefly describe how these open norms are applied by courts.

Until 4 June 2015, the list of ingredients was crucial in legal decisions regarding whether food packages were misleading, known as the labelling-doctrine (for an overview, see: Schebesta & Purnhagen 2016). More specifically, if the list of ingredients was accurate, a food package could not be considered misleading. However, in the *Teekanne* case (2015), the European Court of Justice decided that a food product could also be misleading in case of too much discrepancy between the list of ingredients and the packaging as a whole (De Jager & Verheij 2019). Despite this, the prevailing assumption remains that the list of ingredients determines consumers' expectations about the food product. In other words, in law, misleading food packaging translates to whether the package is misleading to "an average consumer being reasonably well-informed and reasonably observant and circumspect" with the

assumption that this "average consumer" reads the list of ingredients (*Gut Springenheide* 1998; *Teekanne* 2015). The next section provides an overview of the behavioural science literature on how consumers choose food products and the role of packaging in this decision-making process.

3 Consumers' Decision-Making Process

The traditional model of consumer decision making process is the "Five-stage model of the consumer buying process" which involves five steps that consumers move through when buying a product or service (Kotler & Keller 2012; Stankevich 2017; see Figure 1).

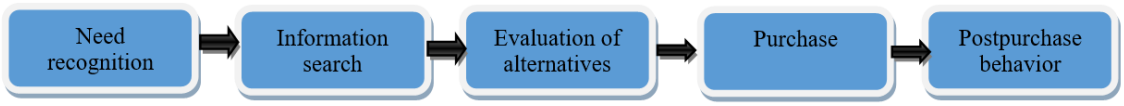

Figure 1. Five-stage model of the consumer buying process (Kotler & Keller 2012).

According to this model, consumers first realize that they need something (step 1), then search for information about different alternatives to satisfy this need (step 2), evaluate the alternatives (step 3), make the purchase (step 4), and finally, evaluate and review the product after the purchase (step 5).

3.1 The Role of the Package and the List of Ingredients

The consumer buying process of food (packages) in supermarkets is complex, with many factors influencing consumer's choices. These include biological determinants (appetite, thirst), economical determinants (costs, income, availability), psychological determinants (mood, stress), social determinants (culture, peers), physical determinants (access, time), and attitudes and knowledge about food (Gelici-Zeko et al. 2013; Jaeger 2006). Additionally, sensory and non-sensory attributes play significant roles (Carrillo et al. 2012; Gelici-Zeko et al. 2013; Underwood et al. 2001). Sensory factors, such as taste, smell, and texture, greatly impact the overall perception of a food product. In addition, non-sensory factors such as packaging and labelling affect consumers' purchase decisions.

Various studies have shown that packaging has an enormous influence on consumer purchase decisions (for an overview see Gelici-Zeko et al. 2013). Packaging elements influencing consumers purchase decisions can be categorized into visual and verbal elements (Butkevičienė et al. 2008; Sørensen et al., 2012). Visual elements, such as colour, pictures, packaging size and shape, and typography, attract consumers' attention by causing the product to stand out in a competitive environment with many other products, and affect sensory expectations about the product (Underwood et al. 2001). Verbal elements communicate the features of a product more directly, potentially increasing consumers´ interest in the product (Carrillo et al. 2012; Grunert 2002). These verbal elements include the list of ingredients, product information and its attributes, and health claims. Consumers differ in their information processing: some consumers rely more on visual aspects of packaging, while others rely more on verbal aspects (Shiloh et al. 2002). Timmerman & Fiszman (2019) found that most consumers did not perceive incongruity between pictorial (ingredient item depiction) and textual (ingredient list) information on food packaging as mismatching. In addition, the study indicates that most perceived mismatches between packages by participants were not related to the ingredient information on the packaging (p. 18, 22, 23). This indicates that

consumers generally focus more on visual elements of packaging than on textual elements (e.g., the list of ingredients). The current study aims to contribute to the existing literature on consumer decision-making by specifically examining whether consumers consult the list of ingredients on food packaging. Contrary to the study by Timmerman & Fiszman (2019), the ingredient list will be placed on the side of the package, following existing packaging designs, rather than besides it.

3.2 Consumers' Cognitive Information Processing and Purchase Intentions

Besides packaging, consumers information processing style and purchase intentions appear to influence their behaviour and decision-making. Current decision-making theories distinguish between two cognitive information processing styles, known as "dual process theories": (1) an intuitive information processing style which is implicit, intuitive, automatic, fast, effortless, and associative (faith in intuition), and (2) a rational information processing style which is slow, effortful, careful, analytical, and more consciously (Kahneman 2012; Dijksterhuis & Nordgren 2006). The rational information processing style is related to an individual's tendency to engage in and enjoy effortful cognitive endeavours, referred to as the need for cognition (Cacioppo & Petty 1982). People with a high need for cognition generally take more information into account when making decisions and enjoy thinking about it. Conversely, those with a low in need for cognition are more inclined to rely on simple cues, intuition, and mental shortcuts when making decisions. For instance, consumers with a low need for cognition sometimes tend to rely more on images and colours then on text, a phenomenon known as the picture-superiority effect (Childers & Houston 1984; Wang 2013). In contrast, processing texts generally requires a slower and more effortful information processing style, which inherently better fits individuals who have a high need for cognition (Schebesta & Purnhagen 2016).

The amount of information or the number of choices could also influence how people process information. Confronted with a large amount of information or many available options, people are more inclined to rely on intuition and shortcuts rather than thoroughly processing all available information or considering every option. This is commonly referred to as choice overload and information overload, respectively (Iyengar & Lepper 2000). One explanation for these phenomena lies in the limited cognitive capacity of individuals, also known as the capacity principle (Dijksterhuis & Nordgren 2006). As a result of this cognitive limitation, even individuals with a high need for cognition are prone to making decisions based on intuition and shortcuts when confronted with excessive information or many choices, similar to how those with a lower need for cognition typically behave under normal circumstances.

Besides different information processing styles, individuals also exhibit varying purchase intentions when buying food products. Examples of purchase intentions in this context could be seeking pleasure, expressing personal identity, or prioritizing health (Grunert 2015). Due to a growing societal emphasis on well-being and health, consumers are increasingly inclined to seek out healthy food options (Block et al. 2011). Consequently, the healthiness of a food product has become an important feature (Wansink & Sobal 2007). For instance, research shows that two in five consumers (43%) "always" look for healthy options, while half (52%) "sometimes" do so (International Food Information Council Foundation & American Heart Association (hereinafter IFICF & AHA) 2019, 3). Packaging plays an important role in shaping consumers' perceptions of a product's healthiness by generating expectations regarding

potential health benefits (Varela et al. 2010). In general, consumers often seem to view healthy food choices as being in conflict with tasty food choices (Baixauli et al. 2008).

Although purchase intentions appear to play an important role in consumers' food choices, it remains unclear whether these intentions influence the likelihood of consulting the ingredient list before purchasing a food product. On the one hand, research shows that consumers seeking healthy food are more likely to read the list of ingredients (IFICF & AHA 2019, 3 and 8). On the other hand, consumers seem to lack the time or motivation to look for detailed written information about food, such as the ingredient list (Wansink & Sobal 2007).

4 Method

4.1 Experiment and Hypotheses

This study focuses on the third phase of the "Five stage model": evaluating alternatives within a supermarket context. Participants were randomly assigned to one of the four conditions in a 2 (two vs. five packages) x 2 (task healthy vs. task tasty) design. Thus, participants were asked to choose either a healthy or a tasty product from two or five strawberry yoghurt packages. The aim was to study how often (hereafter: frequency), for how long (hereafter: duration), and how much participants remember (hereafter: remembering[1]) from the list of ingredients when making a choice between food products of the same product category (strawberry yoghurt).[2] In addition, the study investigated whether participants' need for cognition (NfC: low vs. high) and their purchase intentions (the intention to buy a healthy vs. a tasty product) influence both consulting and remembering the list of ingredients. The variables were measured using a timer, software that tracked participants' clicking behaviour, and knowledge questions.

We expect that increasing the number of options (2 vs. 5 packages) is related to looking less frequently and shorter at the list of ingredients, and remembering less of it (Hypothesis 1). Secondly, we propose that individuals with a high need for cognition will look more frequently, and longer to the list of ingredients, and will remember more (Hypothesis 2). Furthermore, we expect that need for cognition as moderator variable will moderate the main effect of the number of choices (Hypothesis 3). More specifically, we anticipate participants with a high need for cognition consulting the ingredient list more often than those with a low need for cognition, however being a smaller difference in the five package condition due to individuals' limited cognitive capacity. Finally, we predict that participants tasked with selecting a healthy product will consult the ingredient list more frequently and for longer periods, and will retain more information, compared to those tasked with selecting a tasty product (Hypothesis 4).

4.2 Recruiting Participants and Power

A total of 417 participants were recruited in the Netherlands by the research agency Motivaction. The target group consisted of Dutch people aged 18 years or older who shop at supermarkets at least once per month. Participants were compensated for their

[1] We examined remembering to determine whether consumers actually read the list of ingredients, rather than as a competence directly relevant to consumer decision-making.

[2] Thus, the dependent variables were the "frequency" and "duration" participants looked at the list of ingredients, as well as their ability to "remembering" information from it. Need for cognition was studied as a moderator variable.

participation with points, which could be redeemed for a gift voucher or donated to a charity through Motivaction's webshop.

A power analysis was conducted using *G-power*, with the following parameters: Cohen's *d* = 0.3 (medium effect size), *α* = 0.05, *power* = 0.8, and *degrees of freedom:* 3 (Cohen 1988). Since both main effects and interaction effects were tested, we based the power analysis on the most complex test with a 2 x 2 design. Based on the power analysis 191 participants were required for the study.

4.3 Procedure and Measurements

Participants carried out an online experiment.[3] After receiving information about the study and giving informed consent, they answered questions regarding demographic characteristics and individual differences.

Subsequently, participant's cognitive information processing style was assessed using items from the revised Rational-Experiential Inventory (hereinafter: REI) (Epstein et al. 1996; Norris & Epstein 2011; Pacini & Epstein 1999). The REI is a self-report questionnaire designed to measure preferences in information processing, distinguishing between two cognitive styles. The subscale for "rational or analytical information processing" (*need for cognition*) in the original REI (REI-40) includes 20 items (Cronbach's α = 0.90), measured on a five-point Likert-scale (1 = definitely not true of myself; 2 = somewhat not true of myself; 3 = neither true nor untrue of myself; 4 = somewhat true of myself; 5 = definitely true of myself). An example item is "I enjoy solving problems that require hard thinking". Individuals scoring high on this scale prefer a conscious, analytical, and effortful approach to information processing.

Experiential and intuitive information processing was similarly measured using 20 items, with five response options (Cronbach's α = 0.82). Individuals scoring high on this subscale prefer a pre-conscious, automatic, effortless, rapid, and affective approach to information processing. An example item from this subscale is "I like to rely on my intuitive impressions". Individuals scoring high on "rational or analytical information processing" subscale score low on the "Experiential and Intuitive information processing" subscale and vice versa.

To reduce the time required for participation, 15 items from the REI were selected for this study. Participants responded to these items using the same five-point Likert scale. Items that were less relevant to the study's objectives, such as those related to interpersonal information processing (e.g. "I trust my initial feelings about people"), were excluded.

To minimize order effect, the items of both subscales were presented to participants in randomized order. The higher participants' score, the more rational their information processing style (5) and the lower their score the more intuitive their information processing style (1). Some items were conversely scored. For the study, the items were translated from English to Dutch.

Subsequently, participants were randomly assigned to one of the four conditions. At the choice task (see Section 4.3) participants were instructed about taking the package from the shelf and how to turn it around. In addition, they were asked to choose one of the packages.

After the experiment, participants responded to closed-ended questions regarding their motives for selecting a particular product. For example, self-report questions were included to determine whether participants were genuinely seeking a healthy or tasty product. Additionally, participants were asked which elements of the package influenced their decision

[3] Data collection was conducted using Qualtrics, an online survey platform.

(e.g., colours, images, short texts, ingredient list, product name, nutrition facts table, style, and kilocalories). Participants were also tasked with ranking (1 to 3) which side of the package (front, side, or back) had the most influence on their choice. Participants were further asked to rate, on a 7-point Likert scale, the extent to which they had read the list of ingredients (1 = not at all; 7 = very well).

Finally, the memory task consisted of statements about the chosen yoghurt, which participants answered as "true", "false", or "I don't know". The statements were intentionally designed to be conflicting with general assumptions about the ingredients in strawberry yoghurt, ensuring that only participants who had read the ingredient list could respond correctly. The ingredient list was adjusted accordingly (see Section 4.3). The statements were: (1) The yoghurt contains pieces of strawberry (false), (2) The yoghurt contains cacao (true), (3) Sugar is added to the yoghurt (false), (4) The yoghurt contains red beet juice (true), and (5) The yoghurt contains whipped cream (true). The answers were scored on a scale from 0 (no correct answers) to 5 (all answers correct).

4.4 The Choice Task

During the experiment, participants were asked to make a choice out of two or five strawberry yoghurt packages (Figure 2 and Figure 3). These packages were collected from various supermarkets to enhance the ecological validity of the study. Pictures were taken from all sides of the packages and subsequently edited using software. Brand names were replaced with fictitious ones as "Yokoe" and "Melcura" to avoid brand recognition influencing participants´ choice. In addition, the ingredient lists were modified to align with the knowledge questions. Specifically, each ingredient list was edited to include "red beet juice" or "red beet concentrate", "cacao", "strawberry juice out of concentrate", and "whipped cream". The ingredient "sugar" was removed from all lists. Other ingredients in the list remained unchanged, and any package statements that conflicted with the modified ingredient list (e.g., "contains strawberry fruit pieces") were removed.

Figure 2. The packages in the five packages condition.

Figure 3. By clicking on a package, participants could enlarge it and turn it around.

In the instructions, participants were asked to imagine being in a supermarket. The presentation of the packages on a shelf was designed to facilitate this mental imagery. Participants were further instructed being interested in a tasty or healthy strawberry yoghurt, depending on their experimental condition. The first part of the instruction (translated from Dutch) read: "Imagine, you are in a supermarket looking for strawberry yoghurt. You are primarily interested in ***healthy/tasty*** strawberry yoghurt. Please choose one of the strawberry yoghurts below."

Additionally, participants received the following instructions: "You can ***click on a package*** to pick it up and enlarge it. With ***the arrows left and right*** you can rotate the package and view other sides of the package. Click on the cross to return the package to the shelf". After receiving these instructions, participants were asked to make their choice. A JavaScript application in Qualtrics recorded whether participants viewed the sides of the packages (clicking behaviour) and how long they viewed each side (via a timer).

4.5 Selection and Characteristics of the Sample

417 participants took part in the study.[4] However, 25 participants were excluded from the dataset for several reasons: they did not complete the experiment, selected the option "I do not want to participate", or their responses to demographic questions did not align with the demographic information provided by the Motivaction database. In addition, participants were excluded if they completed the questionnaire very quickly (less than 150 seconds, while the expected completion time was 10 minutes), and spent less than 5 seconds on the page with the choice task — an insufficient time to read the instructions or complete the task properly (n = 9). Participants who completed the questionnaire on a smartphone were also excluded, as the choice task was not compatible with that device (n = 3). Lastly, one extreme outlier, who spent 3500 seconds viewing the front side of the package and thus deviated more than 3 standard deviations from the mean, was removed from the dataset.

The final dataset consisted of 379 participants. Of these, 59.1% were men (with one participant identifying as "other"). The mean age was 55.51 years (SD = 14.87 years). Additionally, 34% of participants were highly educated (in the Netherlands: HBO level or higher). The mean score for need for cognition was 3.34 (SD = 0.63). Participants were almost evenly distributed across the four experimental conditions: two packages with a healthy goal task n = 93, two packages with a tasty goal n = 99, five packages with a healthy goal task n = 96, and five packages with a tasty goal task n = 91.

5 Results

5.1 Descriptive Statistics

A total of 67% of the participants did not view the side of the package that displayed the list of ingredients. Additionally, 47.2% of participants clicked on the package to enlarge it. Among those who looked at the side of the package with the list of ingredients, the majority did so only once (9% of all participants) or twice (12%).

[4] The final sample size exceeded the number required by the power analysis (417 vs. 191), since in this calculation we made assumptions regarding the effect sizes to be found. Such calculations inherently involve uncertainty and generalization, so we chose to err on the side of caution, given that effect sizes might be smaller than anticipated. Additionally, a larger sample size allows for exploratory subgroup analysis if necessary.

On average, participants spent 9.36 seconds (*SD* = 23.46) viewing the list of ingredients. In the two packages condition, participants spent on average 9.42 seconds (*SD* = 20.59) examining the list of ingredients on one or both packages. In the five packages condition, they spent an average of 9.29 seconds viewing the list on one or more of the five packages (*SD* = 26.13).

Regarding the five knowledge questions, 54.1% of participants did not answer any question correctly, 28.5% answered one question correctly, 10.6% provided two correct answers. Additionally, 6.9% of participants correctly answered three or four questions, while only 1.1% of participants answered all five questions correctly.

5.2 Data Analysis

The assumptions of normality of the residuals and linearity applying for analysis of variance (ANOVA) were violated. As discussed in section 5.1, a substantial number of participants either did not look to the list of ingredients, viewed it for a very short duration, or answered none of the knowledge questions correctly. This resulted in a left-skewed distribution of the data. To address this issue, a logarithmic transformation was initially conducted (Tabachnick & Fidell 2019). However, even after this transformation, the residuals were still not normally distributed (Shapiro Wilkinson test sig < .001). Consequently, the dependent variables "frequency", "duration", and "remembering" were dichotomized into two groups.

The "frequency" variable was dichotomized into Group 0 (participants who viewed the list for less than 1 second, *n* = 255) and Group 1 (participants who viewed it for 1 second or longer, *n* = 124). Viewing the list of ingredients for less than 1 second was classified as "did not look" since fast clicks to turn the package would otherwise be misclassified as "viewed the list". Similarly, the "duration" variable was split into Group 0 (participants who viewed the list for less than 1 second, *n* = 255) and Group 1 (participants who viewed it for 1 second or longer, *n* = 124). The "remembering" variable was split into Group 0 (no correct answers, *n* = 205) and Group 1 (1 to 5 correct answers, *n* = 174). Due to the similarity between the dichotomized "frequency" and "duration" variables, only the results for "frequency" were reported.

The moderator variable, need for cognition, was also dichotomized in low (*n* = 181) and high (*n* = 198).[5] This moderator was dichotomized to be in line with the hypotheses (distinguishing high and low need for cognition), for simplicity, and to be able to present differences between groups in cross tables.

The subsequent data analyses were conducted using logistic regression. We used logistic regression for reasons of consistency and to obtain prediction statistics.

5.3 Main Effect of Choice Options

It was expected that an increase in choice options (two versus five packages) would result into participants looking less frequently at the list of ingredients and remembering less information of it (hypothesis 1). As shown in Figure 4A, we indeed found the percentage of participants who viewed the list of ingredients in the two packages condition (39.1%) was significantly higher than in the five packages condition (26.2.%, *OR* = 1.72, *p* = .02, *CI* = (1.01 – 2.69)).[6]

[5] The cut-off point was the median split: 3.27.

[6] The model which tested this was also significant ($p < .001$) and accounted for 10% of the variance (Nagelkerke's $R^2 = .10$).

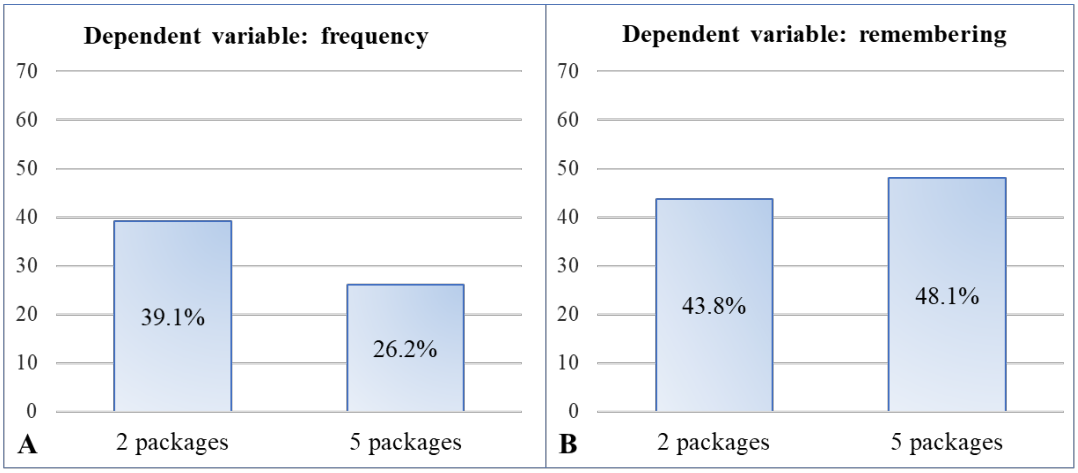

Figure 4. Effect of choice options on the dependent variables frequency (A) and remembering (B).

Contrary to our expectations, with regard to remembering participants in the two packages condition did not differ significantly from those in the five packages condition (*OR* = 0.83, *p* = .38, *CI* = (0.55 – 1.25), p_{model} = .63, Nagelkerke's R^2 = .006), as illustrated in Figure 4B.

5.4 Main Effect of Need for Cognition

As predicted, individuals with a high need for cognition (NfC) looked at the list of ingredients more frequently and remembered more information compared to those with a low NfC (hypothesis 2). Specifically, the percentage of participants with a high NfC who looked at the list of ingredients (42.9%) was significantly higher than those with a low NfC (21.5%, *OR* = 2.66, *p* <.001, *CI* = (1.68 – 4.21)), as shown in Figure 5A.[7] However, we did not find a significant difference in how much participants with a high NfC remembered from the list of ingredients compared to those with a low NfC (*OR* = 1.11, *p* = .60, *CI* = (0.74 – 1.68)), as seen in Figure 5B.[8]

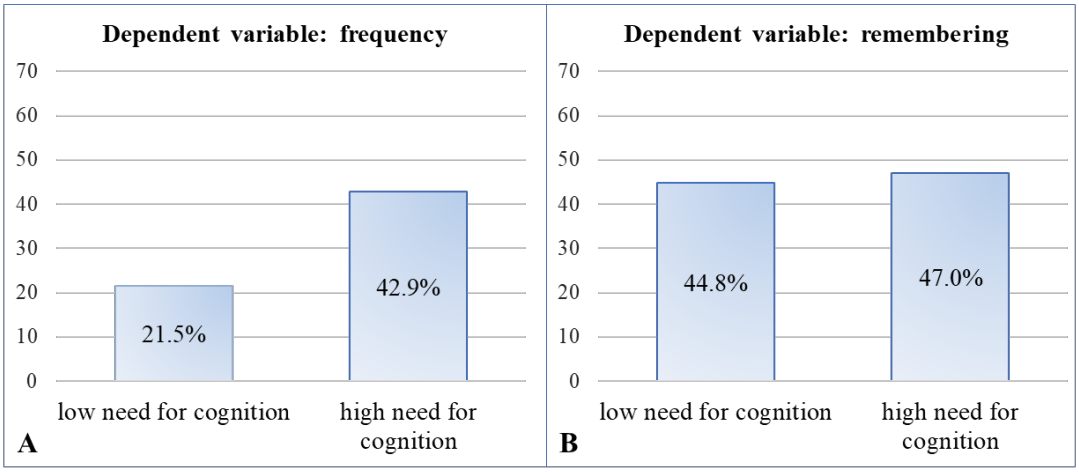

Figure 5. Effect of need for cognition on the dependent variables frequency (A) and remembering (B).

[7] The model was also significant (p < .001), explaining 10 percent of the variance (Nagelkerke's R^2 = .10).

[8] This model was also not significant (p = .63) and accounted for only 0.6 percent of the variance (Nagelkerke's R2 = .006).

5.5 Need for Cognition as Moderator of Choice Option Effects

Thirdly, we hypothesized that the aforementioned effects of NfC would exist mainly in the two-package condition and less so in the five-package condition (hypothesis 3), due to the general cognitive limitations of individuals. However, the interaction between choice options and NfC regarding frequency of looking at the list of ingredients was not statistically significant ((*OR* = 0.7, *p* = .45, *CI* = (0.28- 1.76), $p_{(model)}$ < .001, Nagelkerke's R^2 = .09). Although we found a significant interaction effect between choice options and NfC regarding remembering (*OR* = 2.54, *p* = .03, *CI* = (1.12 – 5.76)), the overall model testing this interaction was not significant (*p* = .11) and explained only 2.1% of the variance (Nagelkerke's R^2 = .021). Despite these results, we found interesting differences between the conditions (Figure 6).[9]

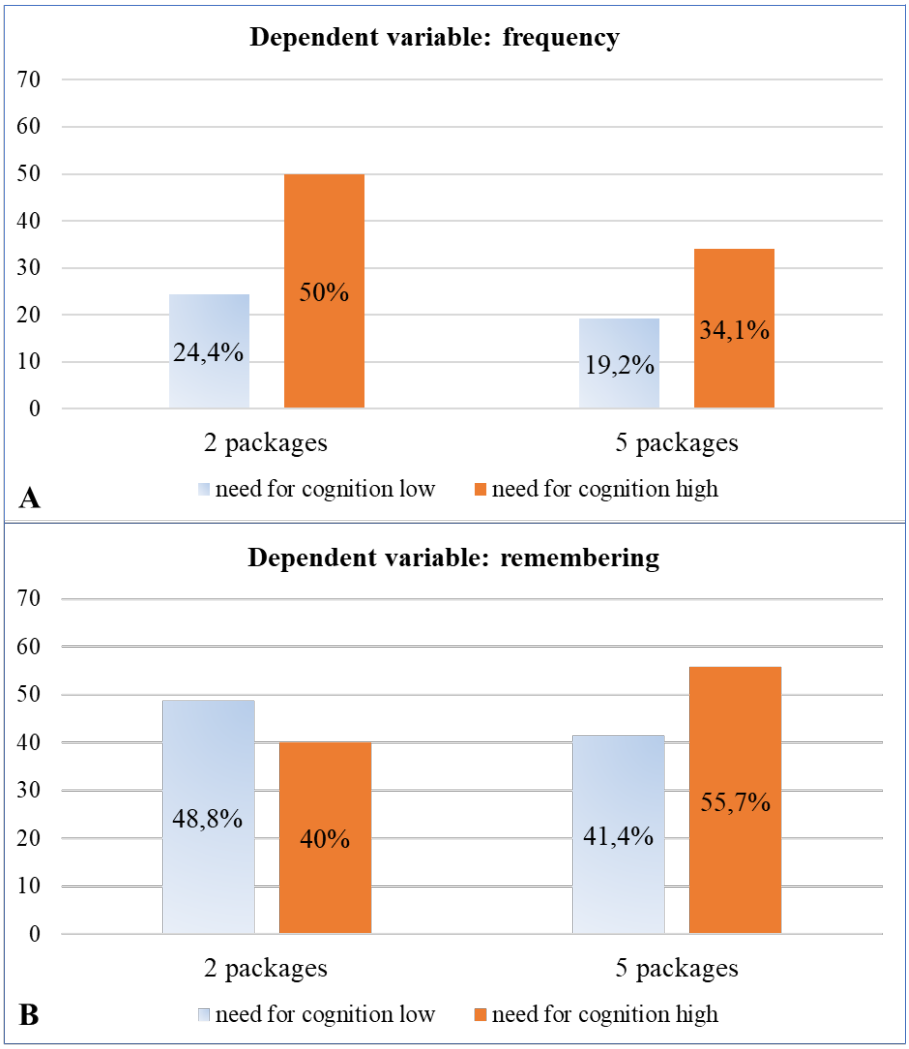

Figure 6. Effect of choice options and need for cognition on the dependent variables frequency (A) and remembering (B).

[9] We tested the contrast of the dependent variables using logistic regression in the different subgroups.

Firstly, participants with a high NfC looked at the list of ingredients significantly more often than those with a low NfC, both in the two packages condition (*OR* = 0.323, *p* = < .001, *CI* = (0.72 – 0.6), $p_{(model)}$ < .001, Nagelkerke's R^2 = .09) and in the five packages condition (*OR* = 0.46, *p* = .02, *CI* = (0.24 – 0.9), $p_{(model)}$ = .04, Nagelkerke's R^2 = .04). Moreover, among high-NfC participants, the percentage of those who looked at the list of ingredients was significantly higher in the two packages condition (50%) compared to the five packages condition (34.1%, *OR* = 1.93, *p* = .03, *CI* = (1.09 – 3.45), $p_{(model)}$ = .02, Nagelkerke's R^2 = .03).

Additionally, in the five packages condition, the percentage of high NfC participants who provided at least one correct answer (55.7%) was higher than that of low NfC participants (41.4%). According to the conventional assumptions (*p* = < .05) this difference was not significant ((*OR* = 0.56, *p* = .052, *CI* = (0.31 – 1)), and the model testing this contrast was also not significant (*p* = .51), explaining only 1 percent of the variance (Nagelkerke's R^2 = .01).

5.6 Main Effect of Goal Task

Fourthly, we hypothesized that participants instructed to choose a healthy product would look more frequently at the list of ingredients and remember more of its contents compared to participants tasked with choosing a tasty product (hypothesis 4). As shown in Figure 7A, the percentage of participants tasked with selecting a healthy product who viewed the list of ingredients (37%) was indeed higher than those tasked with selecting a tasty product (28.4%). According to the conventional assumptions however, this effect did not reach statistical significance (*OR* = 1.55, *p* = .055, *CI* = (0.99 – 2.43)). Despite this, the model itself was significant ((*p* < .001) and accounted for 10 percent of the variance (Nagelkerke's R^2 = .10).

In addition, as depicted in Figure 7B, participants assigned to choose a healthy product were more likely to answer at least one knowledge question correctly (48.1 %), than those tasked with choosing a tasty product (43.7%), but the difference was not statistically significant (*OR* = 1.19, *p* = .39, *CI* = (0.79 – 1.79)), p_{model} < .632, Nagelkerke's R^2 = .006).

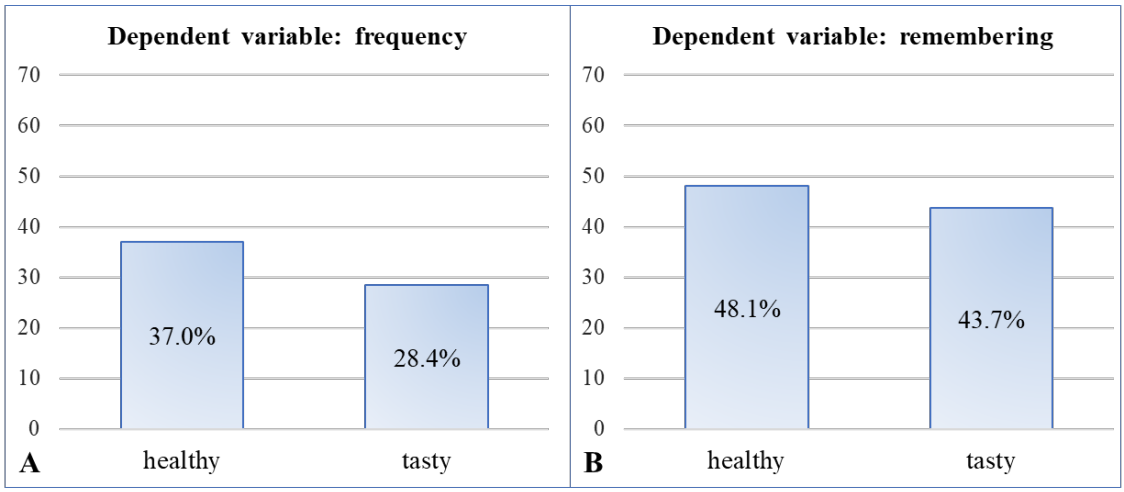

Figure 7. Effect of purchase intention on the dependent variables frequency (A) and remembering (B).

6 Discussion, Limitations, and Implications

6.1 Discussion

This study aimed to assess the legal assumption that the average consumer reads the list of ingredients when purchasing food products. Based on the findings, it seems reasonable to reconsider this assumption, as many consumers do not appear to read the ingredient list. More than two-thirds of participants did not look at the list of ingredients, and many failed to remember the information it contained. Approximately 54% of participants provided incorrect answers to all five knowledge questions, with only 6.9% answering three or more questions correctly.

In addition to these general findings, the study offers insight into the factors influencing whether consumers read the list of ingredients. In legal terms, it sheds light on the variation among consumers who fall under the scope of "the average consumer". The key factors identified include: (1) the large number of available options in a supermarket, (2) consumers' different information-processing styles, and (3) different purchase intentions of consumers.

Firstly, the abundance of choice in supermarkets seems to impact whether consumers consult the ingredient list. As expected, the study revealed that an increase in the number of choice options correlates with a lower likelihood of consumers looking at the ingredient list (39.1% in the two packages condition vs. 26.2% in the five packages condition). This may be explained by choice overload: when confronted with a multitude of options, people tend to rely more on intuition and mental shortcuts rather than analysing written information (see Section 3). Given that supermarkets typically offer a large selection, many consumers tend to base their decisions on factors such as brand familiarity, packaging images, or colours, rather than reading the list of ingredients (Childers & Houston 1984; Wang 2013). Although need for cognition was not found to be a significant moderator (a possible explanation could include the large proportion of participants who did not check the list at all in combination with the small group differences), even participants who generally take more information into account (high need for cognition) seemed affected by the number of choice options. Indeed, a significantly higher percentage of participants with high need for cognition consulted the ingredient list in the two packages condition (50%) compared to the five packages condition (34.1%). This suggest that even individuals with a general tendency to take information into account are less likely to consult the ingredient list when many products are available. This tendency may be attributed to cognitive capacity limitations (capacity principle). Even individuals with a high need for cognition are susceptible to disregarding written information when faced with an abundance of choices. Contrary to expectations, participants in the two packages condition did not remember more of the ingredient list compared to those in the five packages condition. Since the difference was small and statistically not significant, it may simply be due to chance, particularly given that many participants failed to answer any of the knowledge questions correctly.

Secondly, consumers' general propensity to take information into account when making decisions (need for cognition) also influences whether they read the list of ingredients. The study confirms that participants with a high need for cognition more often consult the list of ingredients (42.9%) compared to those with a low need for cognition (21.5%). This difference can be attributed to the fact that individuals with a high need for cognition typically consider more information when making decisions (Dijksterhuis & Nordgren 2006). Conversely, those with a low need for cognition are more inclined to rely on mental heuristics and intuition influenced by visual elements of packaging, e.g. images and colours (a phenomenon known as the picture-superiority effect, see Section 3).

Contrary to expectations, purchase intentions (i.e. the intention to buy a healthy vs. a tasty product) did not significantly influence whether consumers consulted or remembered the list of ingredients (p = .055). However, the results suggest that individuals seeking healthy products were more likely to look at the list of ingredients (healthy condition 37% vs. tasty condition 28.4%) and recall some more information from it compared to those seeking tasty products, e.g. chips or soft drinks (healthy condition 48.1% vs. tasty condition 43.7%). This finding aligns with the literature, which indicates that the list of ingredients seems to be a relevant source of information on the healthiness of food products (IFICF & AHA 2019). Given that the p-value was close to the conventional threshold of 0.05, further research is recommended to explore whether consumers´ intentions to purchase healthy versus tasty products may indeed affect their information/seeking behaviour, specifically consulting the list of ingredients before making a purchase. For example, to ensure that the finding is not a false negative effect, strengthening the manipulation would be valuable in order to enhance the sensitivity of the design. Future studies could also expand on these findings by examining additional factors that may influence consumers´ likelihood of consulting food packaging information, such as food allergies or a personal commitment to purchasing sustainably produced food.

Overall, it appears unlikely that a consumer in an environment with many choice options, who has a low need for cognition and is not specifically seeking healthy products, would consult the list of ingredients on food packaging. Under such circumstances, it is improbable that misleading inferences drawn from visual elements on packaging — such as images or other design features that do not accurately represent the product's ingredients — would be corrected by consulting the list of ingredients. Consumers in these scenarios seem more susceptible to being misled by packaging. Therefore, it seems crucial that, especially in such contexts, all aspects of the packaging (both textual and pictorial) accurately reflect the actual composition of the food product. The findings from this study underscore the importance of integrating these insights into legislation and case law to better protect consumers against misleading food packaging.

6.2 Limitations of the Study

The study has several limitations. At first, a limitation regarding ecological validity. In the experimental setting, people were not genuinely intending to purchase strawberry yoghurt, and the choices they made had no real consequences for them. Due to this limitation, amongst others the finding that 67% of participants did not look at the side of the package displaying the list of ingredients may not fully reflect actual behaviour in real-world situations. In a real supermarket setting, numerous factors could influence consumer choices. Consumers in a supermarket context have personal purchase intentions, make decisions that have real-life consequences, and are able to physically handle the product, which could all impact their likelihood of consulting the list of ingredients.

Despite the limitations regarding ecological validity, an online experiment offers advantages by allowing for the controlled study of one or more variables, minimizing external influences that might confound results in a real-world setting. Therefore, the findings of this study are particularly valuable, as most existing research on ingredient list usage is based on self-reporting, which has its own limitations (Wolf & Ueda 2021).[10] Given these constraints, further research examining consumer behaviour regarding ingredient list usage in an actual

[10] One such example is a lack of insight into one's own behaviour.

supermarket environment would be highly beneficial. Such research could specifically investigate the influence of other packaging elements, such as illustrations, colours, and nutritional claims, to gain deeper insight into consumer buying behaviour and the role of packaging in their purchase decisions. Additionally, it is questionable whether the results of this study can be generalized to other products beyond those covered in this research. We chose to study strawberry yoghurt, as consumers may perceive it as both a healthy and tasty option, and it is widely consumed. Moreover, several legal cases concern the question whether packaging that depicts fruits is misleading when the product contains only a small amount of fruit (De Jager & Verheij 2019). Future studies could explore this issue with other types of products to determine whether the findings hold across different food categories.

A second limitation of this study is that we only measured whether participants looked at the *side of the package* that contained the list of ingredients. While the list of ingredients is a key element on this side, it is possible that participants viewed the side of the package without specifically reading the ingredients list. An indication that participants who viewed the side of the package containing the list of ingredients actually consulted the list is the finding that the percentage of participants who did not look at the list of ingredients (67.3%) is very similar to the self-reported ratings of how thoroughly they examined the list (measured on a Likert-scale from 1, "not read at all" to 7, "read very well"): 57% of participants rated their attention to the list as very low (scoring between 1 and 3, with a mean of 3.11).

In addition, dividing the data of the dependent variables in two groups (dichotomizing the data) has the drawback of loss of information as it reduces the variability among participants to differences between two groups. Furthermore, it is important to note that proportions were tested, which also influences how the data should be interpreted.

Fourthly, to enhance the ecological validity of the study, the design of the cartons looked realistic by being based on existing packaging which may have affected participants' choice behaviour. To mitigate recognition bias, brand names were replaced with fictitious names. However, participants' own dairy purchasing habits and brand preferences might have influenced their choice behaviour, as they could have recognized a brand style. To reduce recognition bias more, it may be better for future research to use cartons not retailed in the countries where the study participants reside, although this might reduce the ecological validity of the study.

Finally, in a scenario where individuals lack a personal interest in the product nor face consequences, their engagement may be strongly guided by the instructions provided. For example, being tasked with selecting a healthy versus a tasty product may directly shape their information search. While ingredient lists are crucial for determining a product's healthiness, they are less relevant for assessing taste. Additionally, it is questionable whether participants who typically prioritize health can be easily redirected to prioritize taste, and vice versa. It is also possible that participants may inherently perceive yoghurt as either a healthy or tasty product, regardless of the task assigned, or even view it as both healthy and tasty simultaneously. Relying on participants' self-reports of their purchase intentions might help mitigate some of these limitations. However, we deliberately chose not to take this approach, instead opting to provide explicit instructions to the participants by asking them to choose a healthy or a tasty product. This decision was based on evidence that individuals generally have limited insight into their own behaviour and intentions (Wolf & Ueda 2021). Moreover, such intentions may change over time and vary across different product categories. Regarding the choice task, it is also important to note that the manipulation check revealed that 54% of participants reported consulting the ingredient list as instructed. In contrast, 46% of participants likely made their decision based on other factors. While the findings highlight

relevant differences between the task groups, one should be careful in interpreting these differences, as participant behaviour may not fully align with the task's intended focus.

As most single scientific studies on human behaviour — which all have their strengths and weaknesses — the present results must be understood in the context of other scientific work. Only on the basis of multiple studies with various methodologies the "reality" can be described, to be used in decision making in practice. The present study provides a controlled and experimental perspective in that framework.

6.3 Some Remarks on the Legal Implications

The literature presents several arguments for being reluctant with incorporating behavioural science insights into legislation or case law. First, these insights may contribute to legal uncertainty (Mak 2017, 599). Second, the relevance of these insights for practical application is questioned, as behavioural science research is predominantly based on laboratory settings (Lurger 2017, 255). In addition, other authors emphasize the absence of an overarching theory on consumer decision-making caused by individual differences in preferences and motives, hindering the development of an overarching policy (Davies 2020, 7). Fourth, since law is inherently normative, it is not evident that empirical facts should dictate legal norms (Blumenthal 2002, 2; for an overview: Giesen 2015).

Despite these concerns, behavioural science research can play a relevant role in developing legislation and case law. Firstly, since 2008, the European Commission used behavioural science insights for developing and implementing policies and legislation (see references in Section 1). Also, the European Court of Justice has explicitly stated that national courts may seek expert opinions or commission consumer research polls to clarify whether an advertisement is misleading (*Gut Springenheide* 1998, 35). The proportion of consumers misled by an advertisement serve as an indicator of its misleading nature for the "average consumer".

Thirdly, behavioural science insights are valuable in light of the legislative goals aimed at prohibiting misleading packaging, thereby protecting consumers and enabling them to make healthy and informed food choices (Regulation 1169/2011, recital 2–3). Indeed, behavioural science research enables to study whether these goals are fostered by legislation and case law. Furthermore, the food packaging industry has long utilized these insights to influence consumer purchase decisions. Therefore, it is desirable that these insights are employed not only for commercial purposes but also for public interests, such as consumer protection.

Fourthly, incorporating behavioural science insights into legislation and case law does not necessarily lead to legal uncertainty. For instance, the finding that most consumers seem not to read the list of ingredients indicates a general trend. This finding should inform an adjustment of the legal concept of the "average consumer" rather than a shift towards a more personalized approach.

6.4 To Conclude

Overall, the list of ingredients seems to play a limited role for consumers with a low need for cognition, in a supermarket context where numerous options are available, and for consumers prioritizing tasty products. The results of the study therefore challenge the legal assumption that "an average consumers reading the list of ingredients" when making food choices. Moreover, given the differences between consumers and its influence on their buying behaviour, one can doubt whether the assumption of an "average consumers" is helpful when legally assessing whether a food package is misleading (see also Schebesta & Purnhagen 2016; Mak & Braspenning 2012). At the very least, this study offers insights into the

differences among consumers who legally fall within the scope of the "average consumer assumption".

Given the results of the study, it is welcomed that the CJEU in *Teekanne* (2015) shattered the labelling doctrine that applied for many years which made the list of ingredients the only element in deciding whether a package was legally misleading. Indeed, the study shows that the list of ingredients plays a limited role for many consumers. Given the results of the study, it is also questionable whether the still existing assumption that the list of ingredients determines what a consumers may expect of the food product is accurate. This assumption appears to diverge from how consumers actually use (or: not use) ingredient lists. Preserving this assumption has the risk of consumers still being misled through misleading packages since their perception of the product seems to be influenced more strongly by other factors, e.g. illustrations and colours on the package. Consequently, this could impede consumers' ability to make informed and healthy food choices.

To better facilitate informed decision-making and promote consumer health, it is recommended to replace the assumption of "the average consumer reading the list of ingredients" by an assessment of the package *as a whole*. The list of ingredients then is no longer the starting point but yet one of the aspects a judge should take into account when deciding whether a package is misleading.

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Data Availability The questionnaire and data supporting the findings of this study are available from the corresponding author upon request.

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Competing Interests The authors declare no competing interests.

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