

HOW DO IMPLICIT/EXPLICIT ATTITUDES AND EMOTIONAL REACTIONS TO
SUSTAINABLE LOGO RELATE? A NEUROPHYSIOLOGICAL STUDY

Giulia Songa¹, Hendrik Slabbinck², Iris
Vermeir² and Vincenzo Russo¹

Authors Note

¹ Behavior and Brain Lab, Iulm University, Milan (Italy).

²Department of Marketing, Ghent University, Ghent (Belgium)

Correspondence concerning this article should be addressed to Giulia Songa, PhD,
Behavior and Brain Lab, Iulm University, building 5, Room 516, Via Santander, 7, Milan,
MI 20143. E-mail: giulia.songa@gmail.com

Abstract

Food package labels can be used to influence consumers' evaluation and purchasing behaviour, fostering sustainable consumption. Therefore, it is important to understand consumers' emotional reaction to food package labels that convey sustainable information. The aim of the present research is to get a better understanding of the relation between consumers' attitudes and emotional reactions often used to measure the effectiveness of a communication. Particularly, we focused on recyclability, assessing participants' prior explicit and implicit attitudes towards recyclability and their emotional reaction to food packages featuring logos of (non-)recyclability. The emotional reaction was measured both at an explicit and at an implicit level, using direct (self-reported) and indirect (eye movement, facial expressions and pupil dilation) techniques respectively. Results showed that explicit attitudes predicted self-reported emotions, while implicit attitudes predicted the spontaneous emotional reactions, highlighting the importance to assess both explicit and implicit attitudes. Moreover, results showed that the relation between the time that people looked at the logo and the spontaneous emotional reaction was contingent upon the participant's implicit attitudes. Finally, a follow-up analysis revealed that people with positive implicit attitudes towards recyclability were faster in detecting the recyclable logo and spent more time on processing the logo, which on its turn resulted in better emotional reactions. Thus, the results suggest that implicit attitudes influence both visual attention and emotional reactions. Overall, the research contributes to a better understanding of the relation between prior attitudes and emotional reactions to food packaging, and supports the use of an approach that comprises both direct and indirect measures of attitudes and emotions.

Keywords: Implicit Association Test; eye-tracking; consumers' emotions; attitudes; visual behaviour; indirect measurement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

1. Introduction

Consumers increasingly include sustainable criteria when buying food products. To evaluate the ecological sustainability of products, consumers often use on-package labels (Bublitz, Peracchio, & Block, 2010; Rousseau, 2015). Past research suggest that package labels not only convey useful information to consumers, but also influence product expectations, evaluations, willingness to buy, and consumptions (Bublitz et al., 2010; Lee et al., 2013; Silayoi, & Spence, 2004; Verbeke, & Ward, 2006). Package labels are of particular interest for (packaged) food (Fernqvist, & Ekelund, 2014; Lee et al., 2013). Because most sensory and intrinsic food quality aspects such as taste, smell and appearance are in many circumstances only detectable after consumption, consumers have to rely on other sources of information to gain trust in the food they purchase and eat (Fernqvist, & Ekelund, 2014). This information is often communicated in the form of labels (Caswell, & Padberg, 1992). Yet the effectiveness of package labels depends on the ability to provide credible communication on the qualities that are featured on the label (Grunert, 2016) and the emotional reactions they elicit (Bloch, 1995; Liao et al., 2015; Silayoi, & Speece, 2004). Package labels have a great potential to foster sustainable consumption (Zander et al., 2015; Hoogland et al., 2007) and positive emotional reactions to package labels may drive sustainable purchase behaviour (Lee, & Holden, 1999; Brochado, 2016; Koenig-Lewis, 2014; Wang, & Wu, 2016). Previous studies recorded an important role of emotions in predicting pro-environmental purchasing behaviour in the context of ecologically responsive packaging (Koenig-Lewis, 2014; Roberts, & Bacon, 1997). To deepen our understanding of emotional reactions to sustainable information on packaging, two aspects need further consideration. First, it is key that emotions that consumers experience when confronted with (non-)sustainable information on packaging are fully and correctly measured. Emotional responses are typically measured with self-reports (Buckworth et al., 2013). Yet, consumers may not be fully aware of their emotional responses (Boca, 1996; Greenwald, & Banaji, 1995), and even when they are aware, they may be overly positive to report about them (Crosby, Bromley, & Saxe, 1980; De Maio, 1984; Maass, Castelli, & Arcuri, 2000; Paulhus, 1984; Wilson, & Sasse, 2000). These problems illustrate the importance to go beyond self-report measures to develop a fuller understanding of emotional reactions to package labels, either or not containing sustainability cues. In this study, we use both self-report measures and physiological measures to assess emotional reactions. Second, a better and more nuanced view on the antecedents of emotional reactions is needed. Prior attitudes are considered as an important determinant of emotional responses. Previous research showed that emotional reactions depend on someone's prior affective dispositions or attitudes (Cacioppo, & Petty, 1979; Cacioppo, Petty, & Marshall-Goodell,

1984; McHugo et al., 1991). Yet, the relation between prior attitudes and emotional responses to package labels has been overlooked so far. A better understanding of this relation is important because attitudes and emotional reactions are often used to assess the effectiveness of marketing and communication campaigns (De Pelsmacker et al., 2001; Forehand, & Perkins, 2005). Relying on current insights in attitude research, we distinguish between implicit and explicit attitudes. The use of this approach will result in concrete insights on how to effectively communicate sustainable product features through package labels.

1.1. On package labels & information processing.

Consumers use packaging information for their purchasing decisions (Bredahl, 2004; Mueller et al. 2010; Imm et al. 2012), thus, it is important to understand their attention on food packaging and labels. When consumers evaluate food labels, visual attention is the principal way to acquire information (LaBerge, 1995; Pieters, & Warlop, 1999) and it is related to decision making (Pieters, & Warlop, 1999; Chandon, 2002). Research has mainly used retrospective self-report measures (Verbeke, & Ward, 2006; Mackison et al, 2010), but self-report measures are poor indicators of consumers' visual attention. Indeed people are unlikely to remember exactly what they were looking at, because some information could be processed implicitly or heuristically (Smit, & Neijens, 2011) and visual attention may also operate unconsciously (Kellogg, 1980; Baddeley, 1990; Rosbergen et al, 1997). Eye movements instead are good behavioural indicators to measure visual attention and information acquisition (Russo, 1978; Rizzolatti et al., 1994). For this reason, eye-tracking allows the objective assessment of consumers' attention to food labels (Wedel, & Pieters, 2007). This technique has been applied in the field of food choice to assess perceptions of wine labels (Meillon et al. 2008), and to evaluate attention to nutrition information (Jones, & Richardson, 2007; Rawson et al., 2008; Bialkova, & van Trijp, 2011; van Herpen, & van Trijp, 2011; Graham et al., 2012; Antúnez et al., 2013). Consumers spend just a few seconds in choosing which product they will buy and they do not pay attention to all the information that is featured on the labels (Milosavljevic, & Cerf, 2008). For this reason, it is important to understand what they look at during the first seconds of exposure and how they react emotionally.

1.2. Emotions and their assessment

The emotional appeal of products is becoming increasingly important to gain competitive advantage in the marketplace because products are now often similar with respect to objective

characteristics such as technical specifications, quality, and price. Also, consumers spend just a few seconds in evaluating a product, which is not sufficient to process all information thoroughly (Celsi, & Olson, 1988). Hence, consumers increasingly rely on their emotions to make choices (Garg et al., 2007; Gobé, 2001; Kotler, 1973; Schwarz, 1990). Research acknowledges that a strong and emotional appeal is also important to foster sustainable choices and may help to close the gap between the intention and actual behaviour to behave sustainable (Manzel, 2013). Previous studies suggest that the amount and the cognitive value of the information on the sustainability of the food that is displayed on packaging do not play a major role in consumers' food choices. This because consumers are sceptic about the information or the information may activate a kind of an 'eco = bad' intuition (Gadema, & Oglethorpe, 2010; Young et al., 2010). Thus to compensate this negative or weak effect of the informative and cognitive value of eco labels, it is important to understand consumers' emotional reactions to them because positive emotional responses do play an important role in predicting pro-environmentally purchasing behaviour (Koenig-Lewis, 2014; Roberts, & Bacon, 1997).

Consumers' emotional reactions comprise two different dimensions: an immediate, spontaneous response, and a reflective, cognitive evaluation of their feelings (Koenig-Lewis, 2014). Consumers may rely on their immediate emotional response or on reflective evaluations, depending on the situation, the consumers' motivations, and their available resources and time (Petty, & Cacioppo, 1986; Petty, & Wegener, 1998). Thus, both dimensions are needed to fully understand consumers' emotional reactions. Emotions can be measured with two different types of methods: direct self-report measures and autonomic, physiological measures (Larsen, Norris, & Cacioppo, 2003; Poels, & Dewitte, 2006). The first type reflects the introspective reasoning about experienced emotions, while the latter reveals automatic and bodily changes related to emotions, focusing on continuous emotional reactions that are not affected by higher cognitive processes (Poels, & Dewitte, 2006). The study of consumers' emotional responses to labels relied predominantly on direct techniques, such as interviews and questionnaires, which are not expensive, easy and quick to administer (Poels, & Dewitte, 2006). Next to likert type of scales (e.g. the Pleasure Arousal Dominance scale, Mehrabian, 1996), emotions are often assessed by means of non-verbal pictorial scales. These non-verbal pictorial scales have multiple advantages. First, the lack of "straight" translations for many emotional words causes problems when comparing different cultures (Desmet, 2003). Non-verbal scales, can be used with people from different cultures without translation problems and avoid potential distortions related to different interpretations of semantic categories and numbers (Bradley, Greenwald, & Hamm, 1993; Morris, Bradley, & Wei, 1994). In addition, pictorial scales can also be used with people that have language difficulties as children,

illiterate or aphasic people (Bradley, & Lang, 1994). The “Self-Assessment Manikin” (SAM, Lang, 1980; Hodes, Cook, & Lang, 1985) is one of these measures. SAM comprises different scales representing the three major affective dimensions: valence, arousal and dominance, as a sequence of manikins that visually express them (Figure 1). Subjects have to indicate which one of the figures represents their feeling.

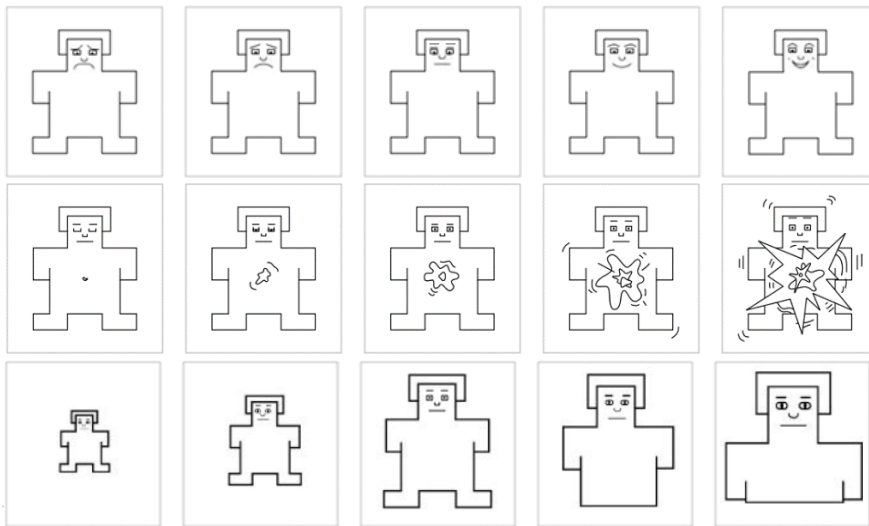


Fig. 1. SAM scales: valence (top panel), arousal (central panel), and dominance (bottom panel)

SAM has been widely used because it is easy to understand, language-free and culture-free (Bradley, Greenwald, & Hamm, 1993; Morris, Bradley, & Wei, 1994) and has good psychometric properties (Hodes, Cook, & Lang, 1985). This measure has been also used to study emotional reaction to packaging (e.g. Liao et al., 2015). Contrary to self-report measures, autonomic measures allow to assess the more spontaneous, less conscious or automatic part of a response, focusing on continuous emotional reactions that are not affected by higher cognitive processes. Among these measures (Cacioppo, & Tassinary, 1990; Lang et al., 1993; Mauss, & Robinson, 2009; Scherer, 2005), pupil dilation and facial expressions are good indicators of consumers’ emotional reactions.

The pupil dilates when the subject looks at an interesting (Hess, 1975; Seeber, & Kerzel, 2011) or emotionally appealing stimulus (Krugman, 1964; Miller, 1967). Pupil dilation is related to many consumer reactions (for an overview, see Wang and Minor, 2008). For example, pupil dilation is related to sales leads (Van Bortel, 1968), actual sales (Hess, 1968), risky choices (Fiedler, & Glöckner, 2012), choice behaviour (de Gee et al., 2014), consumer attitudes and interests (Wedel, & Pieters, 2008, King 1972) and may outperform the predictive power of self-report measures of emotions (Krugman, 1965). This measure has been used to evaluate consumers’ responses to

packaging (Hess, 1968; Krugman, 1966). Next to pupil dilation, also facial expressions are related to emotional responses. The analysis of facial expressions to evaluate emotional responses originates from Charles Darwin's idea that facial expressions are outward manifestations of an inner state (Darwin, 1965). Starting from this point, Paul Ekman demonstrated the existence of prototypical facial expressions for six basic emotions: rage, fear, disgust, happiness, joy, surprise and sadness (Ekman, & Friesen, 1971; Ekman, Soreson, & Friesen, 1969). Other evidences that facial expressions are valid and reliable indicators of the emotional state of an individual were provided by Russel (1994) and Mauss and colleagues (2005). In particular, Mauss found high and significant correlations between the emotional value of the stimuli and the facial behaviour of the subjects. Today software can automatically identify facial expressions using algorithms that track and use the facial muscles movements to recognize the emotions, analysing the type of emotion, the level of arousal and the valence of the affective reactions (Lewinski et al., 2014). Facial expressions have been used to measure emotional reactions to food packaging (Pentus, 2014).

1.3. Attitudes and their assessment

Current insights in psychology distinguish between two different types of attitudes: explicit and implicit attitudes. Explicit attitudes represent a person's conscious view towards people, objects, or concepts of which people are fully aware of. Implicit attitudes are evaluations that occur automatically or without conscious awareness. The relational strength between implicit and explicit attitudes depends on the attitude domain with strong correspondence for insignificant topics such as attitudes towards consumer goods and weak correspondence for (socially) sensitive topics. Because attitudes towards sustainability are sensitive to socially desirable responding (DeMaio, 1984; Edwards, 1957; Maass, Castelli, & Arcuri, 2000), correlations between explicit and explicit attitudes towards different aspects of sustainability are typically weak (Beattie, & Sales, 2009 and 2011; Beattie, 2010). This makes the urge to assess both the implicit and explicit part of sustainability attitudes necessary. Yet, unlike explicit attitudes, implicit attitudes are less accessible through introspection (Fazio, 1990; Gawronski, & Bodenhausen, 2006; Strack, & Deutsch, 2004; Wilson, Lindsey, & Schooler, 2000; Zogmaister, & Castelli, 2006). Hence implicit attitudes require different measurement procedures (De Houwer, 2005; Kraus, & Piqueras-Fizman, 2016). As people are fully aware of their explicit¹ attitudes, they can easily be assessed with self-reports,

¹ In this paper, we will follow De Houwer and colleagues' recommendation, using the term "implicit" (vs. "explicit") for the features of psychological constructs, and the term "indirect" (vs. "direct") to describe the characteristics of the specific measurement procedures (De Houwer et al., 2009).

unequivocally asking participants to what extent a certain attitude is relevant for them. However, because people may not be fully aware of their implicit attitudes, they are traditionally assessed indirectly (Banaji, 2001; Kitawaki, & Nagabuchi, 1998). In addition, indirect measures also allow the assessment of information that people do not want to communicate (Bargh, 2002; Greenwald, & Banaji, 1995). The Implicit Association Test (IAT, Greenwald, McGhee, & Schwartz, 1998) is by far the most widespread and validated indirect measure of attitudes. The IAT is a computerized response latency task that is assumed to measure the relative strengths of associations amongst two pairs of contrasted concepts (e.g. ‘positive–negative’ and ‘recyclable – non-recyclable’). Many researchers consider the IAT to be the most reliable measure of implicit attitudes currently available (e.g. De Houwer, & De Bruycker, 2007; Nosek, Greenwald, & Banaji, 2007). The usefulness of the IAT has especially been proven in research assessing attitudes towards sensitive topics (McConnell, & Leibold, 2001; Green, Carney, Pallin, Ngo, Raymond, Iezzoni, & Banaji, 2007), research predicting impulsive and compulsive behaviours (Jajodia, & Earleywine, 2003; Wiers, Van Woerden, Smulders, & de Jong, 2002), and research in which people may exhibit ambivalent feelings (Röös, & Tjärnemo, 2011). In these domains, the predictive validity of IAT measures significantly exceeded those of self-report measures. The IAT has also demonstrated to be a good predictor of impulsive or unhealthy food choices (Conner, Perugini, O’Gorman, Ayres, & Prestwich, 2007; Craeynest et al., 2007; Friese, Hofmann, & Wanke, 2008; Hofmann, & Friese, 2008; Kraus et al., 2016; Perugini, 2005; Richetin et al., 2007; Werle et al., 2013) and of pro-environmental preferences (Beatty, & McGuire, 2015; Slabbinck et al., 2011; Vantomme, 2005).

1.4. The present research

Nowadays, a wide variety of sustainability-related food information schemes is featured on food packages aiming to promote sustainable consumption (European Commission, 2012). Yet, previous studies suggest that the amount and the cognitive value of the information on the sustainability of the food that is displayed on packaging do not play a major role in consumers’ food choices (Bray et al., 2011; Chatzidokis et al., 2007; De Boer et al., 2009; Dutra de Barcelas et al., 2011; Krystallis et al., 2009). For this reason, it is important to understand consumers’ emotional reaction to them, as emotional responses do play an important role in predicting pro-environmentally purchasing behaviour (Koenig-Lewis, 2014; Roberts, & Bacon, 1997). Moreover, as emotional responses depend on someone’s prior attitudes (Brenner et al., 2013), it is important to assess both the consumers’ attitudes and emotional responses.

Past research already investigated the relation between implicit attitudes and visual attention to information on sustainability on packaging (Beatty, & McGuire, 2015) and between implicit pro-environmental attitudes and pro-environmental consumer behaviour (e.g. Vantomme et al., 2005). However, the relation between attitudes and consumers' emotional reactions to package labels has not yet been investigated. Recent studies found that different packaging features generate effects on different emotional responses measured by self-report and physiological measures respectively. For instance, Liao and colleagues (2015) investigated consumers' emotional responses to three food packaging elements: colour, typefaces and images. Results of their study suggest that while typefaces generate a conscious response that can be measured by self-report measures, images elicit an emotional response that can best be measured by means of physiological measures. The authors assert that the use of both kinds of measures can provide a wider and more complete interpretation of consumers' emotional responses to food packaging elements. Thus, in line with Liao et al. (2015) we assess both automatic, spontaneous emotional responses as well as self-reported, reflective evaluations of emotions. Yet, we add to this stream of research by focussing on an important antecedent of emotional reactions, namely prior attitudes, and distinguish between implicit and explicit attitudes. Because both implicit attitudes and spontaneous emotional reactions are not or less controllable (Fazio, 1990; Gawronski, & Bodenhausen, 2006; McGhee, & Schwartz, 1998; Strack, & Deutsch, 2004; Wilson, Lindsey, & Schooler, 2000; Zogmaister, & Castelli, 2006), we expect that implicit attitudes are related to spontaneous emotional reactions. Similarly, because explicit attitudes as well as self-reported emotions are the result of cognitive evaluations (Banaji, 2001; Jacoby, Stephen, & Jeffrey, 1992; Kitawaki, & Nagabuchi, 1998; Greenwald, & Banaji, 1995) we further expect that explicit attitudes are related to self-reported emotions. In addition, by monitoring eye movements, we test the idea that package labels need to capture the attention of the potential consumers in the first few seconds after exposure to elicit positive emotional reactions (Milosavljevic, & Cerf, 2008). To test our expectations, we measured both implicit and explicit attitudes towards recycling and presented the participants food packages featuring either or not logos of (non-)recyclability. Emotional responses were recorded during exposure of the food packages and evaluated by means of self-reported emotions immediately after exposure of the food packages.

2. Materials and methods

2.1. Participants

Eighty-nine students (67% female) of a large continental European university in Ghent (Belgium) participated in this study in turn for course credits ($M_{\text{age}} = 22$ years, $\text{range}_{\text{age}} = 20\text{-}25$ years). All participants gave their informed consent prior to participation.

2.2. Design and procedure

Participants were first welcomed and informed that they will take part in an eye-tracking experiment that will require them to perform some tasks on a desktop computer, including the evaluation of some pictures. They were informed neither on the specific aim nor on the specific topic of the research. The experiment started with the assessment of participants' attitudes towards recyclability, measured by means of an Implicit Association Test and a self-report measure. They then were presented with 6 food product images of six different food products while an eye-tracking and a webcam recorded their visual attention and the emotional reactions to the stimuli. Each food product featured either a 'recyclable logo', a 'non-recyclable logo' or 'no logo'. Both the order and the type of the logo were randomized within subjects, resulting in a 6 (picture) X 3 (logo) within-subjects design. Thus, each participant was confronted in a random order with 6 images of different food products, varying in type of label. After each exposure to a food product image, participants also expressed their feelings towards that image using a self-report scale.

Figure 2 illustrates the overall procedure.

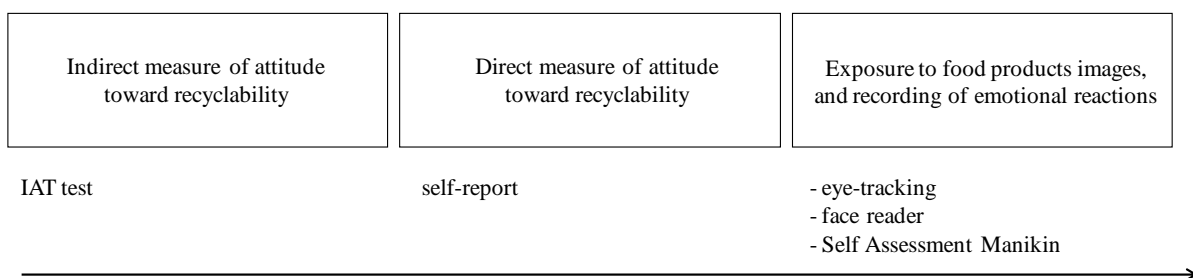


Fig. 2. Experimental procedure

2.3. Materials

2.3.1. Experimental manipulation

For each of the six products we used, we created a set of images representing the same food products in three different versions: 6 product images featured a “recyclable” logo, 6 pictures featured a “non-recyclable” logo, and 6 product pictures without logos. The images had a size comparable to real products and were shown on a Dell 17.3-inch monitor. Participants were seated 60 cm away from the computer display, so they could identify the logo. Fig. 3 shows the different images.

| Recyclable | Non-recyclable | Without logos |
|---|---|--|
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Fig. 3. Illustration of the food products used.

2.3.2. *Indirect attitude measurement procedure*

Participants were asked to complete an Implicit Association Test (IAT, Greenwald et al. 1998), measuring their implicit attitudes towards recyclability. The IAT consisted of five blocks of trials in which participants were instructed to categorize words or pictures as quickly as possible into different categories by pressing a left (E) or right (I) key on an AZERTY keyboard. Each word or picture was presented equally often and in a random order. In Block 1 (20 trials) participants had to sort recyclable and non-recyclable related pictures into the 'Recyclable' and 'Non-Recyclable' categories. Figure 4 shows the pictures that we used for each category. For half of the participants, the label 'Recyclable' was presented on the upper left corner of the computer screen and 'Non-recyclable' was presented on the upper right corner of the computer screen. Thus, these participants had to press the 'E' key whenever a picture of the recyclable category was presented and the 'I' key whenever a picture of the non-recyclable category was presented. The other half of the participants started with the category labels in reversed position and, consequently, had to press the 'E' key for pictures of the non-recyclable category and the 'I' key for pictures of the recyclable category. Block 2 (20 trials), required participants to distinguish words representing pleasant or unpleasant concepts. The 'Pleasant' category was assigned to the left key and the 'Unpleasant' category to the right key for all participants. Stimuli representing the 'Pleasant' (aangenaam) category were Dutch translations of 'nice' (leuk), 'friendly' (aardig), 'pleasant' (plezant), 'fine' (fijn), 'lovely' (prettig) and 'great' (tof). Stimuli for the unpleasant category were 'creepy' (akelig), 'unpleasant' (onprettig), 'nasty' (lastig), 'unfavourable' (ongunstig), 'annoying' (ambetant) and 'undesired' (ongewenst). Block 3 (60 trials) combined the 'Recyclable–Non-recyclable' categorization and the 'Pleasant–Unpleasant' categorization. The position of the categories and their assignment to response keys were identical to those in Blocks 1 and 2. Block 4 (20 trials) was identical to Block 1, except that the positions of the 'Recyclable' and 'Not-recyclable' categories and their corresponding response keys were reversed. Finally, Block 5 (60 trials) was identical to Block 3 except for the reversed position of the 'Recyclable' and 'Not-recyclable' categories and their assignment to the response keys. Stimuli were presented in the centre of the screen. Category labels were displayed on the upper right and left corner of the white screen. Inter-stimulus interval was 200 ms. False responses were followed by an error message that disappeared only after participants pressed the correct response. Figure 4 shows the images.













| Recyclable | Non-recyclable |
|--|--|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Fig. 4. Stimuli used for the IAT test

Table 1 – Implicit Association Test: Task sequence

| <i>Sequence</i> | <i>N° of trials</i> | <i>Task</i> | <i>Response key assignment</i> | |
|-----------------|---------------------|--------------------------------|--------------------------------|--------------------------|
| | | | <i>Left key (E)</i> | <i>Right key (I)</i> |
| 1 | 20 | Target discrimination | Recyclable(*) | Non-recyclable(*) |
| 2 | 20 | Attribute discrimination | Pleasant | Unpleasant |
| 3 | 60 | First combined task | Recyclable/Pleasant(*) | Non-rec/Unpleasant(*) |
| 4 | 20 | Reversed target discrimination | Non-recyclable(*) | Recyclable(*) |
| 5 | 60 | Reversed combined task | Non-rec/Pleasant(*) | Recyclable/Unpleasant(*) |

(*) the positions of recyclable and non-recyclable were reversed for half of the participants.

2.3.3. *Self-reported measure of attitude towards recyclability*

A self-reported scale was used to measure explicit attitude towards recyclability. Participants had to indicate the answer that better described their attitude on a 5-points Likert scale (“I like products with a recyclable packaging more than products with a non-recyclable packaging”) ranging from 1 (“I totally disagree”) to 5 (“I totally agree”). Higher values indicated a stronger preference for products with a recyclable than a non-recyclable packaging, reflecting a positive attitude towards recyclability.

2.3.4. *Emotional reactions to food product images*

Each food product image was presented in the middle of a computer screen for six seconds. During the image presentation, participants’ eye movements and pupil dilations were recorded through a SMI-RED250 eye-tracker. In addition, the valence of their facial reactions to each image was automatically tracked and analysed by means of face recoding software (Noldus FaceReader5). After each image, participants expressed their feelings towards the image using the 5-point Self-Assessment Manikin valence scale (SAM, Bradley, & Lang, 1994; Hodes, Cook, & Lang, 1985; Lang, 1980).

2.4. *Data preparation and preliminary analyses*

2.4.1. *Indirect and direct attitudes towards recyclability*

IAT scores were computed using the improved scoring algorithm of Greenwald et al. (2003). Positive values indicated a positive attitude towards recyclability. Consistent with the IAT score, higher scores on the self-report measure indicated a positive attitude towards recyclability.

2.4.2. *Emotional reactions: facial expressions, pupil dilation and self-reported scores*

Pupil diameter during the observation of “recyclable” and “non-recyclable” logos was standardized using the participant’s pupil diameter during the exposure to images without logos as the baseline. This procedure allows the assessment of the modification in pupil diameter that is only

due to the specific information that is displayed (i.e. the logo), while controlling for the different basal pupil diameter of the participants (Beatty, 1982) and for the luminance or the brightness of the images (Hess, 1972). For the same reasons, a similar procedure was applied to the facial expression data. In particular, individual facial expression scores were based on the valence metric that is provided by the Noldus Software. This metric is based on the facial movements that are related to both positive and negative emotions and includes a calibration procedure that corrects for possible person-specific biases. Particularly, the valence is calculated as the intensity of ‘Happy’ minus the intensity of the negative emotion with the highest intensity.

The measurements were taken for the total exposition time (6 seconds) and averaged. We calculated separate facial expression indices for the images with and without logo. The facial expression indices of “recyclable” and “non-recyclable” logos were standardized using the participant’s facial expression score during the exposure to images without logos as the baseline. This allowed us to have facial expression scores that only reflect emotional responses to the specific logo on the package. The self-reported SAM scores did not require any further data preparation.

To facilitate the interpretation and to increase the robustness of our findings, we averaged the scores across the logo conditions for each measure separately. By doing so, we obtained for each participant individual scores for the “recyclable” and the “non-recyclable” images as we did for the facial expression measure, the pupil dilation measure, and the SAM measure.

The aim of our study is to investigate the relation between prior attitudes and emotional responses. However, because the IAT integrates two different target categories (Recyclable vs. Not-Recyclable), the IAT yields relative scores². Accordingly, to maximize the methodological correspondence and hence the interpretability of our results, we also computed relative scores for our emotional reactions. Thus, the differences between standardized pupil dilation, the standardized facial expressions, and the SAM scores for “recyclable” and “non-recyclable” logos were calculated for each participant, resulting in a “Pupil difference”, a “Facial Expression difference”, and a “SAM difference” score respectively. For each measure, higher scores indicated a more positive emotional reaction towards the recyclable than towards the non-recyclable logos. Table 2 shows the mean and the standard deviation of all measures.

² This is, an IAT score of zero indicates no difference in the associative strength between “recyclable”-positive, and “non-recyclable”-positive

Table 2 – Descriptive statistics

| | <i>mean</i> | <i>standard deviation</i> | <i>range</i> |
|------------------------------|-------------|---------------------------|--------------|
| IAT score | 1.02 | .21 | -2/2 |
| Likert score | 3.35 | .70 | 1/5 |
| SAM difference | .97 | .73 | -4/4 |
| Pupil difference | .34 | .41 | - |
| Facial expression difference | .02 | .01 | - |

3. Results

3.1. Attitudes

A one sample t-test revealed the IAT differed significantly from zero-point, indicating that participants had a positive implicit attitude towards recyclability ($M_{IAT} = 1.02$; $SD_{IAT} = .21$; $t = 44.06$, $p < .001$). Results further showed that the explicit attitude towards recyclability ($M_{SelfReport} = 3.35$; $SD_{SelfReport} = .7$) differed significantly from the central point of the scale ($t = 4.71$, $p < .01$), indicating that participants had also a positive explicit attitude towards recycling.

The two measures were not significantly correlated ($r = .08$, $p > .05$).

3.2. Emotional reaction

A series of one sample t-tests revealed that participants evaluated the packages with a recyclable logo as more positive than the packages with a non-recyclable logo. All the difference scores were positive (Table 2) and significantly different from the zero-point (representing no difference between recyclable and non-recyclable evaluations), indicating that facial expressions ($t = 4.3$, $p < .001$), pupil diameter ($t = 7.46$, $p < .001$) as well as the self-reported evaluations ($t = 12.35$, $p < .001$) were more positive for packages with a recyclable logo than for packages with a non-recyclable logo.

3.3. *Relation between attitudes and emotional reaction*

To investigate the relation between participants' attitudes towards recycling and their reactions to product packages featuring (non-)recycling logos, three OLS regression analyses were performed, using respectively: (1) the "Pupil difference", (2) the "Facial Expression difference", and (3) the "SAM difference" as criterion. The IAT and the self-reported attitude scores were used as independent variables.

Table 3 shows the results of the regression analyses indicating that implicit attitudes towards recyclability predict spontaneous emotional reactions towards packages featuring recycling logos ("Pupil difference" and "Facial difference") whereas self-reported attitudes predict explicit product evaluations ("SAM difference"). Positive implicit (explicit) attitudes translate in positive spontaneous (reflective) emotional reactions towards products that are packed in recyclable packages. These results are in line with research showing that implicit and explicit attitudes may predict different types of reactions (Asendorf et al., 2002; Chen, & Bargh, 1997; Dovidio, Kawakami, & Gaernter, 2002; Dovidio et al., 1997; Fazio et al., 1995; Petty, 2006; Wilson et al, 2000; Zinkernagel, 2011).

Table 3 – Impact of attitudes on reaction to food products

| | <i>SAM</i> | | <i>Pupil difference</i> | | <i>Facial difference</i> | |
|---------------|------------|-----------------------|-------------------------|-----------------------|--------------------------|-----------------------|
| | <i>b</i> | <i>R</i> ² | <i>b</i> | <i>R</i> ² | <i>b</i> | <i>R</i> ² |
| IAT | n.s | | .48** | .23 | .37** | .13 |
| Self-Reported | .45** | .2 | n.s | | n.s | |

*. Significant at the .05 level (2-tailed).

** . Significant at the .01 level (2-tailed).

Because some participants may not have noticed the logo to process the information about recyclability, we also tested an OLS model in which the facial valence score for products with a recyclable packaging were regressed on the total time that participants looked at the recyclable logo (i.e. fixation level), the IAT score, and their interaction. The significant and positive interaction ($\beta = .23$; $p < .05$) indicates that the relation between the IAT score and the facial reaction depends on the time that participants looked at the logo. To facilitate the interpretation, we plotted the interaction and performed a simple slopes analysis. Figure 2 shows the regression lines for different fixation

time levels (Low = Mean – 1 SD, Medium = Mean, and High = Mean + 1 SD). A simple slopes analysis shows that for low levels of fixation on the recyclable logo, the model is not significant ($p > .05$), so the participants' implicit attitudes are not related to the emotional reactions to the depicted logo. Yet, as fixation levels increase, the relation becomes marginally significant at medium fixation levels ($\beta = .31$; $p = .059$), and significant at high fixation levels ($\beta = .55$; $p = .02$). These results indicate that when logos are not noticed, implicit attitudes do not predict facial expressions. Furthermore, a higher fixation time strengthens the predictive nature of implicit attitudes: when people fixate more on the label, a high positive implicit attitude indicates more positive facial expressions than when people fixate less on the label.

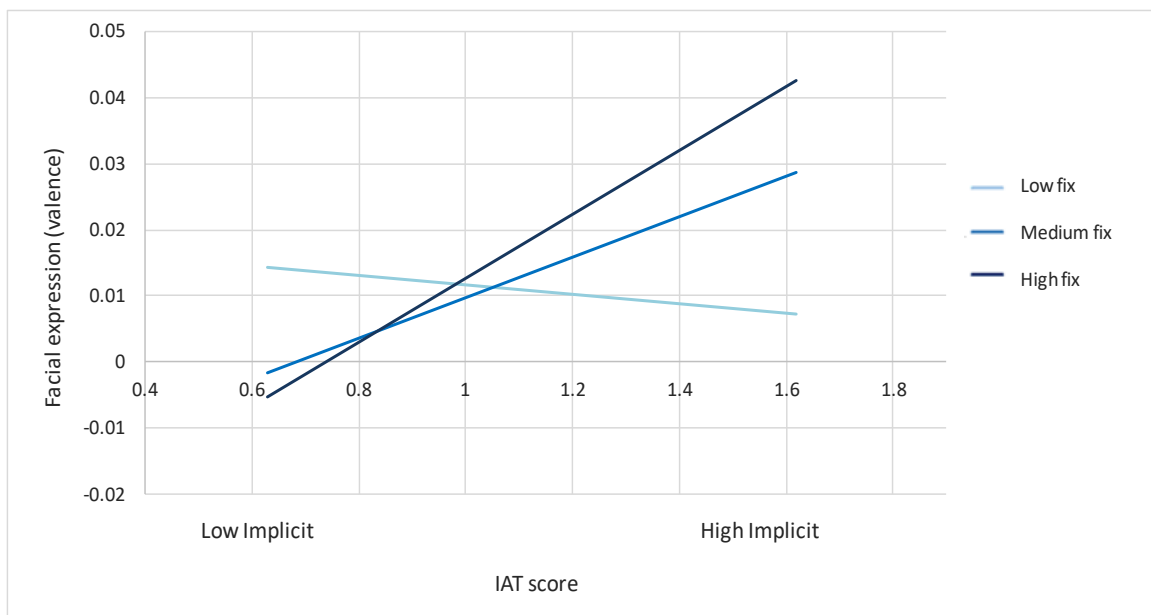


Fig. 5. Relation between IAT score and Facial expression during the exposition to products with a “recyclable logo”, at different levels of time spent watching the logo

We verified whether a similar moderation pattern illustrates the relation between the explicit attitude score and the explicit evaluation of products with a recyclable packaging. In particular, we tested an OLS model in which the SAM score for products with a recyclable packaging was regressed on the total time that participants looked at the recyclable logo (i.e. fixation level), the explicit score, and their interaction. The interaction was not significant ($\beta = .13$; $p > .05$), indicating that the relation between the explicit attitude score towards recyclability and the explicit emotional evaluation of the products with recyclable packaging did not depend on the time spent watching the logo.

We investigated the relation between the implicit attitude score and the facial valence score for products with a non-recyclable packaging using an OLS regression model. In this model the facial valence score for products with a non-recyclable packaging was regressed on the total time that participants looked at the recyclable logo (i.e. fixation level), the IAT score, and their interaction. The interaction was not significant ($\beta = .11$; $p > .05$) indicating that the relation between the IAT score and the facial reaction for non-recyclable packaging did not depend on the time that participants looked at the logo.

A follow up analysis was performed to verify the relation between attitudes and visual attention, because in previous research the attitude (and particularly the implicit attitude) towards sustainable features of products was related to visual behaviour (Beatty, & McGuire, 2012; 2015). An OLS regression analysis was performed, using the time to first fixation of the recyclable logo as dependent variable. The time to first fixation indicates the time in seconds from the stimulus (image of packaging) onset until the start of the first fixation in the specific area of interest (recyclable logo). The IAT and the self-reported attitude scores were used as independent variables. Table 4 shows the results of this regression analysis, indicating that implicit attitudes towards recyclability predict the time to the first fixation on the recyclable logo, whereas explicit attitudes did not. Particularly, when people have a more positive implicit attitude towards recyclability, they need less time between the onset of the image and the detection of the logo. We conducted a similar analysis on the non-recyclable logo, but neither the IAT, nor the self-reported attitude reached significance. Apparently, attitudes towards recyclability do not translate into the speed with which non-recyclable logos are detected.

Table 4 – Impact of attitudes on the time to the first fixation on the logos

| | <i>Time to first fixation</i> | | | |
|---------------|-------------------------------|-------------------|---------|--------------|
| | <i>b</i> | <i>Std. Error</i> | β | <i>Sign.</i> |
| Self-Reported | - 114.39 | 157.44 | -.077 | .47 |
| IAT | - 1363.69 | 506.14 | -.286 | .01** |

*. Significant at the .05 level (2-tailed).

** . Significant at the .01 level (2-tailed).

4. Discussion and Conclusions

The aim of the present research was to get a better understanding of the relation between prior attitudes and consumers' reactions to food packages featuring logos of (non-)recyclability. Our findings are in line with past research about the role of packaging in consumers' product evaluations and product expectations (Bublitz, Perrachio, & Block, 2010; Lee et al. 2013; Verbeke, & Ward, 2006) by showing that the information on packaging influences consumers' emotional reactions to the product. Yet, while previous research relied mainly on self-reports to measure emotional responses to packaging information, our research deepened the understanding of emotional reactions to sustainable information on packaging by assessing both self-reported emotional evaluations, as well as automatically recorded neurophysiological responses (i.e. facial expressions, eye movements and pupil dilation). Unlike self-reports, neurophysiological measures allow the recording of spontaneous emotional responses that people are not fully aware of. Our results show that participants had both more positive self-reported and neurophysiological emotional reactions to packages with recyclable logos than to packages with non-recyclable logos. Moreover, we also investigated the effect of consumers' prior explicit and implicit attitudes on emotional responses to package labels because this relation has been overlooked so far. As expected, explicit attitudes predict self-reported emotions, while spontaneous emotional reactions were predicted by implicit attitudes. The results highlight the importance of using both implicit and explicit measures, because they assess related but distinct attitude constructs (Nosek, & Smyth, 2007) that are related to different types of emotional responses (Chen, & Bargh, 1997; Dovidio, Kawakami, & Gaernter, 2002; Dovidio et al., 1997; Fazio et al., 1995; Petty, 2006; Wilson et al, 2000).

Our results corroborate insights from dual processing models. These models distinguish automatic processes which are faster and less conscious, from reflective processes which are slower and more aware (Gawronski, & Bodenhausen, 2006; Strack, & Deutsch, 2004; Wilson, Lindsey, & Schooler, 2000). Decisions under time pressure may then be driven by implicit emotional reactions making both implicit attitudes and neuro-physiological measures of emotions more predictive of behaviour (Dijker, & Koomen, 1996). On the other hand, a lack of time pressure can render higher importance to explicit attitudes and reflective emotional evaluations in determining behaviour (Friese, Wanke, & Plessner, 2006). For this reason, it is important to understand both the immediate spontaneous emotional reactions, that drive fast or impulsive choices, and the more reflective

emotional reactions, that drive slower and more conscious and rational choices (Kahneman, 2011; Lee, & Kacen, 2007; Ochsner, & Phelps, 2008).

Interestingly, results showed that the relation between the IAT score and the facial reaction depends on the total time that participants looked at the logo, while the relation between the explicit attitude score and the explicit evaluation of the products does not depend on the time spent watching the logo. Positive implicit attitudes generate higher positive emotional reactions when fixation time increases. These results suggest that implicit attitudes may drive immediate emotional reactions whereas explicit attitudes do not. Since time spent watching on a logo does not affect explicit emotional evaluation, this may indicate that this explicit emotional evaluation rather reflects previously acquired emotions than immediate evaluations. Also results suggest that packaging labels especially influence emotional evaluations for people who already have positive attitudes towards the topic (in this case sustainability) that is promoted by the label. However, as labels do not foster positive emotions in people with negative emotions towards recyclability, it seems that labels are inappropriate tools to turn negative attitudes into positive attitudes. Yet, this needs to be confirmed in future research as previous studies found that emotions elicited by communication did influence attitudes (Janis, 1967; Holbrook, & Batra, 1987).

Our results also show that that the relation between implicit attitudes towards recyclability and the emotional facial reactions depends on the time that participants looked at the logo. That is, the longer that people fixate at the recyclable logo, the stronger the relation between implicit attitudes and spontaneous emotional reactions. Or put differently: implicit attitudes towards recyclability are important predictors of spontaneous emotional reactions, but only for (relatively) easy to detect logos of recyclability. This relation was not found for non-recyclable logos. Indeed, the relation between previous implicit attitudes toward non-recyclability and emotional reaction to non-recyclable packaging was not moderated by the time that participants spent watching the non-recyclable logo. A possible explanation could be that people who are not positive toward recyclability do not consider recyclability as a priority or a crucial topic (Hansmann et al., 2006), and hence, neglect or don't spend time on information on recyclability. Interestingly, a follow up analysis showed that people who have a positive implicit attitude towards recyclability, were also faster in detecting the recyclable logo. Apparently, our implicit attitudes do not only predict how we react emotionally, but they also steer our visual attention, consistently with previous studies (Songa, & Russo, 2017). This is in line with research that suggests that people search for external stimuli in line with their own implicit attitudes (Perugini & Prestwich, 2007).

Overall, at a theoretic level our results contribute to better understand the relation between prior attitudes and emotional reactions to food packaging. Furthermore, the research supports the use of an integrated approach that comprises both direct and indirect measures of attitudes and emotions. Indeed, the research underscores the importance of implicit measures of attitudes that reveal unconscious associations that affects consumers' spontaneous emotional reactions, and the usefulness of psychophysiological measures to assess consumers' true feelings that are not revealed through self-report measures. Our results provide insights in consumers' emotional response to packaging labels without considering the consequences of these emotional responses such as buying intentions or behaviour.

We applied the IAT as conceptualized by Greenwald and colleagues (1998) for the assessment of implicit motives. Even though the validity of this variant has been intensively investigated and many researchers consider this variant as one of the most reliable implicit measures (Bar-Anan, & Nosek, 2014; Gawronski, & De Houwer, 2014), it certainly has its limitations. We address three of them. First, the features of the IAT impose the use of relative measures. Further research could also assess the willingness to pay for products showing (non)-recyclable labels to see whether emotional reactions drive consumers' purchase behaviour. The relative nature of our measures was imposed by the features of IAT. The use of relative measures can be justified by the fact that the human thinking has a relative nature (e.g. Azar, 2007), and that many decisions in everyday life add up to weighing two or a limited number of options (Greenwald et al., 1998). However, inclusion of other, absolute implicit measures may be useful to disentangle different effects and separate underlying processes for positive (e.g. recyclable) and negative (e.g. non-recyclable) logos. Second, people may have used spontaneous or strategic simplifications in one of the two combined categorization tasks in the IAT (i.e. Block 3 and Block 5 of the IAT procedure). This phenomenon is known as 'recoding' and may cause method variance in the IAT score (Rothermund et al., 2009). Even though we cannot exclude that our IAT scores reflect also recoding variance next to attitudinal variance, we believe that our results are most likely conservative estimates of the true correlation between implicit attitude measures and the behavioural responses, assuming that recoding may have impacted both explicit measures and the IAT, but not the spontaneous emotional reactions and gaze behaviour. However, to minimize method variance in IAT scores, future research may benefit from alternative IAT procedures. Noteworthy in this context is the recoding free IAT (IAT-RF: Rothermund et al., 2009) that is especially constructed to eliminate strategically recoding. Lastly, we used affective attribute categories (i.e. pleasant versus unpleasant). Instead, we could also have used general evaluative attribute categories (i.e. positive versus negative). Even though different conceptualizations of attitudes are mostly highly interrelated (Delage et al., 2016), results could

have been different if we used different attribute categories. Yet, it remains for future research to establish the distinct roles that different operationalization of attitudes may play in predicting behavioural outcomes.

Another possible limitation of the study is the explicit measure of attitude toward recyclability. The question “I like products with a recyclable packaging more than products with a non-recyclable packaging” was chosen to maximize the structural correspondence with the IAT measure, because the question was framed to reflect the relative nature of the IAT. Nevertheless, the measure put a strong emphasis on the product (‘I like products ...’) and may refer to either brands or the content. For this reason it could be that the implicit and explicit measures assessed two different concepts. To test this alternative hypothesis, we ran an additional study in which we assessed attitudes towards recycling with exactly the same measures as in the initial study, together with a ‘real’, validated attitude towards recycling measure. A sample of 75 students (35 males; 40 females) from the same University of the first study participated in exchange of a course credit (mean age: 22 years; SD = 1.31). The participants performed the same IAT and one-question measure as we used in the main study. Moreover, we added a 3-item measure of a validated attitude towards recycling scale: “I believe that my recycling behaviour will help reduce wasteful use of landfills”; “I believe that my recycling behaviour will help conserve natural resources”; “I feel good about myself when I recycle” (Ahmad et al., 2016; do Valle et al., 2005; Ramayah et al., 2012; Sidique et al., 2010). A principal components analysis of all attitude measures (IAT and all direct measures) with subsequent varimax rotation yielded a two-factor solution according to the Eigenvalue > 1 criterion and the scree-test. The two factors accounted for 51.67% and 20.11% of variance. All the four direct attitudes measures comprised the first factor (loadings > .68, cross-loadings < .07) and the IAT measure fully covered the second factor (loading = .99, cross-loading = .018). A Cronbach’s alpha analysis further revealed that all four direct measures were internally consistent ($\alpha = .81$) and this coefficient could not be substantially improved by deleting the one-question attitude measure that we used in our initial study ($\alpha = .82$ if the one-question is deleted). Finally, the Pearson correlations among all attitude measures illustrate that the IAT score is not correlated with any direct attitude measure whereas all direct attitude measures are highly correlate with each other. We report the correlations in Table 5 in the Appendix. We believe that these results provide sufficient evidence that the one-item attitude measure that we used in our initial study reflects the participants’ direct/conscious attitude towards recycling, excluding that the results of the main study are due to the fact that the implicit (IAT) and explicit (self-reports) assess two different concepts.

One of the measures used to assess participants’ emotional response was the pupil dilation. This measure could be affected by several variables as the luminance (de Groot and Gebhard, 1952)

and the stress due to cognitive events (Kahneman & Beatty, 1966; Kahneman, 2011). We took under control both the effect of the different basal pupil diameter of the participants (Beatty, 1982) and of the luminance or the brightness of the images (Hess, 1972) by standardizing the pupil diameter during the observation of the logos using the participant's pupil diameter during the exposure to images without logos as the baseline. All the features of the packaging with recyclable and non-recyclable logos were taken identical in order to avoid that other information could affect the pupillary (or other autonomic) responses. The fact that the pupil dilation results are in line with the facial expressions supports the interpretation of pupil dilation as index of emotional response, consistently with previous research (Hess, 1975; Seeber, & Kerzel, 2011; Krugman, 1964; Miller, 1967) also in the study of consumers' attitudes and interests (see Wedel, & Pieters, 2008; King 1972) and consumers' responses to packaging (Hess, 1968; Krugman, 1966). Nevertheless, in future research could be useful to add a measure of stress to take under control the possibility that the pupil dilation was affected by this variable.

The research was focused on a specific feature (recyclability) in a specific field of food products. Even though our results seem promising, they need to be replicated with other products and different product features to verify whether the same patterns of prediction will emerge. Moreover, all research participants were students. Thus future studies are needed to determine the generalizability of our findings to different age groups, cultures or other socio-demographic variables.

Finally, the study is conducted in a research lab environment, far from real-life situations. Due to the exploratory nature of the research and the sensitivity of the psychophysiological measures to external factors (e.g. light and brightness), we chose to use a research environment in which luminance, dimensions and brightness of all the pictures and logos could be controlled. Yet, presenting product on a computer screen is different from being confronted with products in a retail environment. Thus, a possible direction for future research is to extend the study to an ecologically more valid environment such as real supermarkets.

References

- Ahmad, M.S., Bazmi, A.A., Bhutto, A.W., Shahzadi, K., & Bukhari, N. (2016). Students' responses to improve environmental sustainability through recycling: quantitatively improving qualitative model. *Applied Research in Quality of Life*, *11*(1), 253-270
- Antúnez, L., Vidal, L., Sapolinski, A., Giménez, A., Maiche, A., & Ares, G. (2013). How do design features influence consumer attention when looking for nutritional information on food labels? Results from an eye-tracking study on pan bread labels. *International Journal of Food Science and Nutrition*, *64*(5), 515-527
- Asendorpf, J.B., Banse, R., & Muecke, D. (2002). Double dissociation between implicit and explicit personality self-concept: The case of shy behaviour. *Journal of Personality and Social Psychology*, *83*(2), 380-393
- Azar, O.H. (2007). Relative thinking theory. *The Journal of Socio-Economics*, *36*(1), 1–14
- Baddeley, A. D. (1990). *Human memory: Theory and practice*. Boston: Allyn and Bacon
- Banaji, M.R. (2001). *Implicit attitudes can be measured*. In H.L. Roediger, J.S. Nairne, I. Neath, & A. Surprenant (Eds.), *The nature of remembering: Essays in honor of Robert G. Crowder* (pp. 117-150). Washington, DC: American Psychology Association
- Bar-Anan, Y., & Nosek, B.A. (2014). A comparative investigation of seven indirect attitude measures. *Behavior Research Methods*, *46*, 668-688
- Bargh, J.A. (2002). Losing consciousness: Automatic influences on consumer judgment, behavior, and motivation. *Journal of Consumer Research*, *29*, 280-285
- Beattie, G. (2010). *Why aren't we saving the planet? A psychologist's perspective*. London & New York: Routledge
- Beattie, G., & McGuire, L. (2012). See no evil? Only implicit attitudes predict unconscious eye movements towards images of climate change. *Semiotica*, *192*, 315-339
- Beattie, G., & Sale, L. (2009). Explicit and implicit attitudes to low and high carbon footprint products. *International Journal of Environmental, Cultural, Economic and Social Sustainability*, *5*, 191-206
- Beattie, G., & Sale, L. (2011). Shopping to save the planet? Implicit rather than explicit attitudes predict low carbon footprint consumer choice. *International Journal of Environmental, Cultural, Economic and Social Sustainability*, *7*, 211-232

- Beattie, G., & McGuire, L. (2015). Harnessing the unconscious mind of the consumer: How implicit attitudes predict pre-conscious visual attention to carbon footprint information on products. *Semiotica*, 204, 253-290
- Beatty, J. (1982). Task-evoked pupillary responses, processing load, and the structure of processing resources. *Psychological Bulletin*, 91(2), 276-292
- Bialkova, S., & Van Trijp, H. (2011). An efficient methodology for assessing attention to and effect of nutrition information displayed front-of-pack. *Food Quality and Preference*, 22, 592-601
- Bloch, P.H. (1995). Seeking the Ideal Form: Product Design and Consumer Response. *Journal of Marketing*, 59, 16-29
- Boca, S. (1996). I processi cognitivi automatici in psicologia sociale: concettualizzazione e metodi d'indagine. *Giornale Italiano di Psicologia*, 23, 29-60
- Bradley, M.M., & Lang, P.J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*, 25(1), 49-59
- Bradley, M.M., Greenwald, M.K., & Hamm, A.O. (1993). *Affective picture processing*. In N. Birbaumer & A. Ohman (Eds.). *The structure of emotion: Psychophysiological, cognitive, and clinical aspects*. Toronto: Hogrefe & Huber
- Bray, J., Johns, N., Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. *Journal of Business Ethics*, 98, 597-618
- Bredahl, L. (2004). Cue utilization and quality perception with regard to branded beef. *Food Quality and Preference*, 15, 65-75
- Brener, L., Rose, G., Von Hippel, C., & Wilson, H. (2013). Implicit attitudes, emotions and helping intentions of mental health workers towards their clients. *Journal of Nervous and Mental Disease*, 201, 460-463
- Bublitz, M.G., Peracchio, L.A., Block, L.G. (2010). Why did I eat that? Perspectives on food decision making and dietary restraint. *Journal of Consumer Psychology*, 20, 239-258
- Buckworth, J., Dishman, R.K., O'Connor, P.J., Tomporowski, P.D. (2013). *Exercise psychology* (2nd ed). Champaign IL: Human Kinetics
- Cacioppo, J.T., & Petty, R.E. (1979). Attitude and cognitive response: An electrophysiological approach. *Journal of Personality and Social Psychology*, 37, 2181-2199
- Cacioppo, J.T., & Tassinary, L.G. (1990). Inferring Psychological Significance from Physiological Signals. *American Psychologist*, 45(1), 16-28

- Cacioppo, J.T., Petty, R.E., & Marshall-Goddell, B. (1984). Electromyographic specificity during simple physical and attitudinal tasks: Location and topographical features of integrated EMG responses. *Biological Psychology*, *18*, 85-121
- Caswell, J.A., Padberg, D.I. (1992). Toward a more comprehensive theory of food labels. *American Journal of Agricultural Economics*, *74*, 460-468
- Celsi, R.L., & Olson, J.C. (1988). The role of involvement in attention and comprehension processes. *Journal of consumer research*, *15*(2), 210-224
- Chandon, P. (2002). *Do we know what we look at? An eye tracking study of visual attention and memory for brands at the point of purchase.* (INSEAD Working Paper). Fontainebleau.
- Chatzidakis, A., Hibbert, S., Smith, A. (2007). Why people don't take their concerns about fair trade to the supermarket: the role of neutralization. *Journal of Business Ethics*, *74*, 89-100
- Chen, M., & Bargh, J. (1997). Nonconscious behavioral confirmation processes: The self-fulfilling consequences of automatic stereotype activation. *Journal of Experimental Social Psychology*, *33*, 541-560
- Conner, M., Perugini, M., O'Gorman, Ayres, K., & Prestwich, A. (2007). Relations between Implicit and Explicit Measures of Attitudes and Measures of Behavior: Evidence of Moderation by Individual Difference Variables. *Personality and Social Psychology Bulletin*, *33*, 1727-1740
- Craeynest, M., Crombez, G., Haerens, L., & De Bourdeaudhuij, I. (2007). Do overweight youngsters like food more than lean peers? Assessing their implicit attitudes with a personalized Implicit Association Task. *Food Quality and Preference*, *18*(8), 1077-1084
- Crosby, F., Bromley, S., & Saxe, L. (1980). Recent unobtrusive studies of Black and White discrimination and prejudice: A literature review. *Psychological Bulletin*, *87*, 546-563
- Darwin, C. (1965). *The expression of the emotions in man and animals.* Chicago University Press. (Original work published 1872)
- De Boer, J., Boersema, J.J., Aiking, H. (2009). Consumers' motivational associations favoring free-range meat or less meat. *Ecological Economics*, *68*, 850-860
- de Gee J.W., Knapena, T., & H. Donnera, T.H. (2014). Decision-related pupil dilation reflects upcoming choice and individual bias. *Proceedings of the National Academy of Sciences USA*, *111*(5), E618-E625
- De Houwer, J. (2005). What are implicit measures and indirect measures of attitude? A comment on Spence (2005). *Social Psychological Review*, *7*(1), 18-20

- De Houwer, J., & De Bruycker, E. (2007). The implicit association test outperforms the extrinsic affective Simon task as an implicit measure of inter-individual differences in attitudes. *British Journal of Social Psychology*, 46(2), 401-21
- De Pelsmacker, P., Geuens, M., & Van den Bergh, J. (2001). *Marketing Communications*. Pearson Education Limited
- Dalege, J., Borsboom, D., van Harreveld, F., van den Berg, H., Conner, M., & van der Maas, H.L. (2016). Toward a formalized account of attitudes: The Causal Attitude Network (CAN) model. *Psychological review*, 123(1), 2.
- DeMaio, T.J. (1984). *Social desirability and survey measurement: A review*. In C.F. Turner & E. Martin (Eds.), *Surveying subjective phenomena, volume 2* (pp. 257-281). New York: Russell Sage
- Desmet, P. (2003). Measuring Emotion: Development and Application of an Instrument to Measure Emotional Responses to Products. *Funology Human-Computer Interaction Series*, 111-123
- Dijker, A., & Koomen, W. (1996). Stereotyping and attitudinal effects under time pressure. *European Journal of Social Psychology*, 26, 61-74
- Do Valle, P. O., Rebelo, E., Reis, E., & Menezes, J. (2005). Combining behavioural theories to predict recycling involvement. *Environment and Behaviour*, 37, 364-396
- Dovidio, J.F., Kawakami, K., & Gaernter, S.L. (2002). Implicit and explicit prejudice and interracial interaction. *Journal of Personality and Social Psychology*, 82, 62- 68
- Dovidio, J., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). The nature of prejudice: Automatic and controlled processes. *Journal of Experimental Social Psychology*, 33, 510-540
- Dutra de Barcellos, M., Krystallis, A., de Melo Saab, S.M., Kügler, J.O., Grunert, K.G. (2011). Investigating the gap between citizens' sustainability attitudes and food purchasing behaviour: empirical evidence from Brazilian pork consumers. *International Journal of Consumer Studies*, 35, 391-402
- Edwards, A.L. (1957). *The social desirability variable in personality research and assessment*. New York: Dryden
- Ekman, P., & Friesen, W.V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 17(2), 124-129
- Ekman, P., Sorenson, E.R., & Friesen, W.V. (1969). Pan-cultural elements in facial displays of emotion. *Science*, 164, 86-88

- Fazio, R.H. (1990). *Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework*. In M.P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23, pp. 75-109). San Diego, CA: Academic Press
- Fazio, R.H., Jackson, J.R., Dunton, B.C., & Williams, C.J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology*, 69, 1013–1027
- Fernqvist, F., & Ekelund, L. (2014) Credence and the Effect on Consumer Liking on Food-A Review. *Food Quality and Preference*, 32, 340-353
- Fiedler, S., & Glöckner, A. (2012). The dynamics of decision making in risky choice: An eye-tracking analysis. *Frontiers in Psychology*, 3, 335
- Forehand, M.R., & Perkins, A. (2005). Implicit assimilation and explicit contrast: A set/reset model of response to celebrity voiceovers. *Journal of Consumer Research*, 32, 435-441
- Friese, M., Hofmann, W., & Wänke, M. (2008). When impulses take over: Moderated predictive validity of explicit and implicit attitude measures in predicting food choice and consumption behavior. *British Journal of Social Psychology*, 47, 397-419
- Friese, M., Wänke, M., & Plessner, H. (2006). Implicit consumer attitudes and their influence on brand choice. *Psychology & Marketing*, 23(9), 727-740
- Gadema, Z., & Oglethorpe, D. (2011). The use and usefulness of carbon labelling food: a policy perspective from a survey of UK supermarket shoppers. *Food policy*, 36(6), 815-822.
- Garg, N., Wansink, B., & Inman, J.J. (2007). The influence of incidental affect on consumers' food intake. *Journal of Marketing*, 71, 194-206
- Gawronski, B., & Bodenhausen, G.V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, 132(5), 692-731
- Gawronski, B., & De Houwer, J. (2014). *Implicit measures in social and personality psychology*. In H.T. Reis & C.M. Judd (Eds.), *Handbook of research methods in personality psychology*. New York: Cambridge University Press, 2nd edition, 283-310
- Gilbert, S. Fiske & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 323-390). New York: McGraw-Hill
- Gobè, M. (2001). *Emotional Branding: the New Paradigm for Connecting Brands to People*. NY: Allworth Press

- Graham, D.J., Orquin, J.L., & Visschers, V.H.M. (2012). Eye tracking and nutrition label use: A review of the literature and recommendations for label enhancement. *Food Policy*, 37, 378-382
- Green, A.R., Carney, D.R., Pallin, D.J., Ngo, L.H., Raymond, K.L., Iezzoni, L., & Banaji, M.R. (2007). Implicit Bias among Physicians and its Prediction of Thrombolysis Decisions for Black and White Patients. *Journal of General Internal Medicine*, 22(9), 1231-1238
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. K. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, 74, 1464-1480
- Greenwald, A.G., & Banaji, M.R. (1995). Implicit Social Cognition: Attitudes, Self-Esteem, and Stereotypes. *Psychological Review*, 102, 4-27
- Greenwald, A.G., McGhee, D.E., & Schwartz, J.K.L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, 74, 1464-1480
- Greenwald, A.G., Nosek, B.A., & Banaji, M.R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, 85(2), 197-216
- Grunert, K.G. (2016). *Consumer reactions to on-pack educational messages*. In: Burgess, P. (Ed.), *Integrating the packaging and product experience in food and beverages: a road-map to consumer satisfaction*. Woodhead Publishing, pp. 23-35
- Hansmann, R., Bernasconi, P., Smieszek, T., Loukopoulos, P., & Scholz, R.W. (2006). Justifications and self-organization as determinants of recycling behavior: The case of used batteries. *Resources, Conservation and Recycling*, 47(2), 133-159
- Hess, E.H. (1968), *Pupillometrics*. In F.M. Bass, C.W. King, & E.A. Pessemier (Eds.), *Applications of the science in marketing management*. New York: Wiley
- Hess, E.H. (1972). *Pupillometrics: A method of studying mental, emotional, and sensory processes*. In N.S. Greenfield & R.A. Sternbach (Eds.), *Handbook of Psychophysiology* (pp. 491–531). New York: Holt, Rinehart and Winston
- Hess, E.H. (1975). *The tell-tale eye*. New York: Van Nostrand
- Hodes, R.L, Cook, E.W., & Lang, P.J. (1985). Individual differences in autonomic response: Conditioned association or conditioned fear? *Psychophysiology*, 22, 545-560
- Hofmann, W., & Friese, M. (2008). Impulses got the better of me: Alcohol moderates the influence of immediate affective reactions to food cues on eating behavior. *Journal of Abnormal Psychology*, 117, 420-427

- Hofmann, W., Gschwendner, T., Friese, M., Wiers, R. W., & Schmitt, M. (2008). Working memory capacity and self-regulatory behavior: Towards an individual differences perspective on behavior determination by automatic versus controlled processes. *Journal of Personality and Social Psychology, 95*, 962-977
- Holbrook, M.B., & Batra, R. (1987). Assessing the role of emotions as mediators of consumer responses to advertising. *Journal of Consumer Research, 14*(3), 404-420
- Hoogland, C., de Boer, J., Boersema, J.J. (2007). Food and sustainability: do consumers recognize, understand and value on-package information on production standards? *Appetite, 49*, 47-57
- Imm, B.Y., Lee, J.H., & Lee, S.H. (2012). Effects of sensory labels on taste acceptance of commercial food products. *Food Quality and Preference, 25*, 135-139
- Jacoby, L.D., Stephen L., & Jeffrey P.T. (1992), Unconscious Influences Revealed. *American Psychologist, 47*, 802-809
- Jajodia, A., & Earleywine, M. (2003). Measuring alcohol expectancies with the implicit association test. *Psychology of Addictive Behaviors, 17*(2), 126-133
- Janis, I. (1967). *Effects of fear arousal on attitude change; recent developments in theory and experimental research*. In Berkowitz, L. (ed), *Advances in Experimental Social Psychology*, New York: Academic Press, 166-224
- Jones, G., & Richardson, M. (2007). An objective examination of consumer perception of nutrition information based on healthiness ratings and eye movements. *Public Health Nutrition, 10*, 238-244
- Kahneman, D. (2011). *Thinking, Fast and Slow*. Macmillan.
- Kellogg, R. T. (1980). Is conscious attention necessary for long-term storage? *Journal of Experimental Psychology: Human Learning & Memory, 6*, 379-390
- King, A.S. (1972). Pupil size, eye direction, and message appeal: Some preliminary findings. *Journal of Marketing, 36*, 55-58
- Kitawaki, N., & Nagabuchi, H. (1998). Quality Assessment of Speech Coding and Speech Synthesis Systems. *IEEE Communications Magazine, 36*-44
- Koenig-Lewis, N. Palmer, A. Dermody, J. & Urbye, A. (2014). Consumers' evaluations of ecological packaging – Rational and emotional approaches. *Journal of Environmental Psychology, 37*, 94-105
- Kotler, P. (1973). Atmospheric as a marketing tool. *Journal of Retailing, 49*(4), 48-64

- Kraus, A.A., & Piqueras-Fiszman, B. (2016). Sandwich or sweets? An assessment of two novel implicit association tasks to capture dynamic motivational tendencies and stable evaluations towards foods. *Food Quality and Preference*, *49*, 11-19
- Krugman, H. E. (1966). White and Negro responses to package designs. *Journal of Marketing Research*, *3*, 199-200
- Krugman, H.E. (1964). Some applications of pupil measurement. *Journal of Marketing Research*, *1*, 15-19
- Krugman, H.E. (1965). A comparison of physical and verbal responses to television commercials. *Public Opinion Quarterly*, *29*, 323-24
- Krystallis, A., Dutra de Barcellos, M., Kügler, J.O., Verbeke, W., Grunert, K.G. Attitudes of European citizens towards pig production systems. *Livestock science*, *126*(1-3), 46-56
- LaBerge, D. (1995). *Attentional processing: The brain's art of mindfulness*. Cambridge, MA: Harvard University Press.
- Lang, P.J., Greenwald, M.K., Bradley, M.M., & Hamm, A.O. (1993). Looking at pictures: Affective, facial, visceral, and behavioral reactions. *Psychophysiology*, *30*, 261-273
- Larsen, J.T., Norris, C.J., & Cacioppo, J.T. (2003). Effects of positive affect and negative affect on electromyographic activity over zygomaticus major and corrugator supercilii. *Psychophysiology*, *40*, 776-785
- Lee, J.A., & Holden, S.S (1999). Understanding determinants of environmentally conscious behavior. *Psychology and Marketing*, *16*(5), 373-392
- Lee, J.A., & Kacen, J.J. (2008). Cultural influences on consumer satisfaction with impulse and planned purchase decisions. *Journal of Business Research*, *61*, 265-272
- Lee, W.C.J., Shimizu, M., Kniffin, K.M., & Wansink, B. (2013). You taste what you see: Do organic labels bias taste perceptions? *Food Quality and Preference*, *29*(1), 33-39
- Lewinski, P., den Uyl, T. M., & Butler, C. (2014). Automated facial coding: Validation of basic emotions and FACS AUs in FaceReader. *Journal of Neuroscience, Psychology, and Economics*, *7*(4), 227
- Liao, L.X., Corsi, A.M., Chrysochou, P., Lockshin, L. (2015). Emotional responses towards food packaging: A joint application of self-report and physiological measures of emotion. *Food Quality and Preference*, *42*, 48-55
- Maass, A., Castelli, L., & Arcuri, L. (2000). *Measuring prejudice: Implicit versus explicit techniques*. In D. Capozza & R. Brown (Eds.), *Social identity processes* (pp. 96-116). London: Sage

- Mackison, D., Wrieden, W.L., & Anderson, A.S. (2010). Validity and reliability testing of a short questionnaire to assess consumers' use, understanding and perception of food labels. *European Journal of Clinical Nutrition*, *64*, 210-217
- Mauss, I.B., & Robinson, M.D. (2009). Measures of emotion: A review. *Cognition & Emotion*, *23*(2), 209-237
- Mauss, I.B., Levenson, R.W., McCarter, L., Wilhelm, F.H., & Gross, J.J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion*, *5*(2), 175-190
- McConnell, A.R. & Leibold, J.M. (2001). Relations among the Implicit Association Test, discriminatory behaviour, and explicit measures of racial attitudes. *Journal of Experimental Social Psychology*, *37*, 435-442
- McHugo, G.J., Lanzetta, J.T., & Bush, L.K. (1991). The Effect of Attitudes on Emotional Reactions to Expressive Displays of Political Leaders. *Journal of Nonverbal Behavior*, *15*(1), 19-41
- Mehrabian, A. (1996). Pleasure-arousal-dominance: A general framework for describing and measuring individual differences in temperament. *Current Psychology: Developmental, Learning, Personality, Social*, *14*, 261-292
- Meillon, S., Mandran, N., Meillon, B., Urbano, C., & Schlich, P. (2008). The potential of eye tracking techniques in consumer and sensory researches. In *Third European Conference on Sensory and Consumer Research*. Hamburg, Germany, 7th-10th September 2008
- Menzel, S. (2013). Are emotions to blame? The impact of non-analytical information processing on decision-making and implications for fostering sustainability. *Ecological Economics*, *96*, 71-78
- Miller, R. (1967). *The clinical validation of the pupillary response: The effect of chromatic and achromatic stimuli upon pupil responsiveness*. Doctoral Dissertation, Michigan State University
- Milosavljevic, M., & Cerf, M. (2008). First attention then intention. Insights from computational neuroscience of vision. *International Journal of Advertising*, *27*, 381-398
- Morris, J.D., Bradley, M.M., & Wei, L.P. (1994). *Global Advertising and Affective Response: SAM Ratings in U.S.A. and Taiwan* (Working paper). University of Florida
- Mueller, S., Lockshin, L. & Louviere, J. (2010). What you see may not be what you get: Asking consumers what matters may not reflect what they choose. *Marketing Letters*, *21*(4), 335-350
- Nosek, B.A., Greenwald, A.G., & Banaji, M.R. (2007). *The Implicit Association Test at Age 7: A Methodological and Conceptual Review*. In J.A. Bargh (Ed.), *Automatic processes in social thinking and behavior*. (pp. 265-292). New York: Psychology press

- Nosek, B.A., & Smyth, F.L. (2007). A Multitrait-Multimethod Validation of the Implicit Association Test. *Experimental Psychology*, *54*, 14–29
- Ochsner, K.N., & Phelps, E. (2007). Emerging perspectives on emotion–cognition interactions. *Trends in Cognitive Sciences*, *11*(8), 317–318
- Paulhus, D.L. (1984). Two-component models of socially desirable responding. *Journal of Personality and Social Psychology*, *46*(3), 598-609
- Pentus, K., Mehine, T., & Kuusik, A. (2014). Considering emotions in product package design through combining conjoint analysis with psycho physiological measurements. *Procedia - Social and Behavioral Sciences*, *148*, 280- 290
- Perugini, M. (2005). Predictive models of implicit and explicit attitudes. *British Journal of Social Psychology*, *44*, 29-45
- Perugini, M., & Prestwich, A. (2007). The gatekeeper: individual differences are key in the chain from perception to behaviour. *European Journal of Personality*, *21*(3), 303-317
- Petty, R., & Cacioppo, J. (1986). The elaboration likelihood model of persuasion. *Advances in experimental social psychology*, *19*, 123-205
- Petty, R., & Wegener, D. (1998). *Attitude change: Multiple roles for persuasion variables*. In D. Gilbert, S. Fiske & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 323-390). New York: McGraw-Hill
- Pieters, R., & Warlop, L. (1999). Visual attention during brand choice: The impact of time pressure and task motivation. *International Journal of Research Marketing*, *16*, 1-16
- Poels, K., & Dewitte, S. (2006). How to capture the heart? Reviewing 20 years of emotion measurement in advertising. *Journal of Advertising Research*, *46*, 18-37
- Ramayah, T., Lee, J. W. C., & Lim, S. (2012). Sustaining the environment through recycling: An empirical study. *Journal of environmental management*, *102*, 141-147
- Rawson, D., Janes, I., & Jordan, K. (2008). *A pilot study to investigate the potential of eye tracking as a technique for FSA food labelling behaviour research*. Report for the FSA. http://www.fcni.org.uk/sites/default/files/Food_Labelling_and_eyetracking.pdf
- Richetin, J., Perugini, M., Prestwich, A., & O'Gorman, R. (2007). The Iat as a predictor of food choice; the case of fruits vs snacks. *International Journal of Psychology*, *42*(3), 166-173
- Rizzolatti, G., Riggio, L., & Sheliga, B.M. (1994). *Space and selective attention*. In C. Umiltà, & M. Moscovitch (Eds.). *Attention and Performance* (pp. 231-265). Cambridge, MA: MIT Press

- Roberts, B.A., & Bacon, D.R. (1997). Exploring the subtle relationships between environmental concern and ecologically conscious behavior. *Journal of business research*, 40, 79-89
- Röös, E., & Tjärnemo, H. (2011). Challenges of carbon labelling of food products: a consumer research perspective. *British Food Journal*, 113(8), 982-99
- Rosbergen, E., Pieters, R., & Wedel, M. (1997). Visual attention to advertising: A segment-level analysis. *Journal of Consumer Research*, 24, 305-314
- Rothermund, K., Teige-Mocigemba, S., Gast, A., & Wentura, D. (2009). Minimizing the influence of recoding in the implicit association test: The recoding-free implicit association test (IAT-RF). *Quarterly Journal of Experimental Psychology*, 62, 84-98
- Rousseau, S. (2015). The role of organic and fair trade labels when choosing chocolate. *Food Quality and Preference*, 44, 92-100
- Russell, J.A. (1994). Is there universal recognition of emotion from facial expressions? A review of the cross-cultural studies. *Psychological Bulletin*, 115(1), 102-141
- Russo, J.E. (1978). *Eye fixations can save the world: A critical evaluation and a comparison between eye fixations and other information processing methodologies*. In Hunt (Ed.), *Advances in Consumer Research* (pp. 561-570). Ann Arbor, MI: Association for Consumer Research
- Scherer, K. (2005). What are emotions? And how can they be measured? *Social science information*, 44(4), 693-727
- Schwarz, N. (1990). *Feelings as information: Informational and motivational functions of affective states*. In E.T. Higgins, & R. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behaviour* vol. 2 (pp. 527-561). New York: Guilford Press
- Seeber, K.G., & Kerzel, D. (2011). Cognitive load in simultaneous interpreting: Model meets data. *Special issue of the International Journal of Bilingualism*, 16(2), 228-242
- Sidique, S. F., Lupi, F., & Joshi, S. V. (2010). The effects of behavior and attitudes on drop-off recycling activities. *Resources, Conservation and Recycling*, 54, 163–170
- Silayoi, P., & Speece, M. (2004). Packaging and purchase decisions: An exploratory study on the impact of involvement level and time pressure. *British food journal*, 106(8), 607-628
- Slabbinck, H., De Houwer, J., & Van Kenhove, P. (2011). A pictorial attitude IAT as a measure of implicit motives. *European Journal of Personality*, 25, 76-86
- Smit, E.G., & Neijens, P.C. (2011). The March to Reliable Metrics. *Journal of Advertising Research*, 51(1), 124–35

- Songa, G., Russo, V. (2017). Iat, consumer behaviour and the moderating role of decision-making style: an empirical study on food products. *Food Quality and Preference* (in press)
- Strack, S., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8, 220-247
- Van Bortel, F.J. (1968). *Commercial applications of pupillometrics*. In F.M. Bass, C.E. King, & E.A. Pessemier (Eds.), *Application of the sciences in marketing management*. New York: Wiley
- Van Herpen, E., & Van Trijp, H.C.M. (2011). Front-of-pack nutrition labels. Their effect on attention and choices when consumers have varying goals and time constraints. *Appetite*, 57, 148-160
- Vantomme, D., Geuens, M, De Houwer, J., De Pelsmacker, P. (2005). Implicit attitudes toward green consumer behaviour. *Psychologica Belgica*, 45(4), 217-239
- Verbeke, W., & Ward, R.W. (2006). Consumer interest in information cues denoting quality, traceability and origin: An application of ordered probit models to beef labels. *Food quality and preference*, 17(6), 453-467
- Wang, Y.J., & Minor, M.S. (2008). Validity, Reliability, and Applicability of Psychophysiological Techniques in Marketing Research. *Psychology and marketing*, 25(2), 197-232
- Wedel, M., & Pieters, R. (2007). A review of eye-tracking research in marketing. *Review of Marketing Research*, 4, 123-147
- Wedel, M., & Pieters, R. (2008). Eye Tracking for Visual Marketing. *Foundations and Trends® in Marketing*, 1(4), 231-320
- Werle, C. O., Trendel, O., & Ardito, G. (2013). Unhealthy food is not tastier for everybody: The “healthy= tasty” French intuition. *Food Quality and Preference*, 28(1), 116-121
- Wiers, R.W., Van Woerden, N., Smulders, F.T.Y., & de Jong, P.J. (2002). Implicit and explicit alcohol-related cognitions in heavy and light drinkers. *Journal of Abnormal Psychology*, 111, 648-658
- Wilson, G.M., & Sasse, M.A. (2000). Investigating the Impact of Audio Degradations on Users: Subjective vs. Objective Assessment Methods. In *Proceedings of OZCHI*. Sydney, 135-142
- Wilson, T.D., Lindsey, S., & Schooler, T.Y. (2000). A model of dual attitudes. *Psychological Review*, 107, 101-126
- Young, W., Hwang, K., McDonald, S., & Oates, C.J. (2010). Sustainable consumption: green consumer behaviour when purchasing products. *Sustainable development*, 18(1), 20-31.

Zander, K., Hamm, U. (2010). Consumer preferences for additional ethical attributes of organic food. *Food Quality and Preference*, 21, 495–503

Zinkernagel, A., Hofmann, W., Dislich, F.X.R., Gschwendner, T., & Schmitt, M. (2011). Indirect Assessment of Implicit Disgust Sensitivity. *European Journal of Psychological Assessment*, 27, 237-243

Zogmaister, C., & Castelli, L. (2006). La misurazione di costrutti espliciti attraverso l'Implicit Association Test. *Psicologia Sociale*, 1, 65-94

Zhou, G., Hu, W., & Huang, W. (2016). Are Consumers Willing to Pay More for Sustainable Products? A Study of Eco-Labeled Tuna Steak. *Sustainability*, 8, 494

Appendix

Table 5 – Correlation

| IAT measure | | 1. "I like products with a recyclable packaging more than products with a non-recyclable packaging" | 2. "I believe that my recycling behaviour will help reduce wasteful use of landfills" | 3. "I believe that my recycling behaviour will help conserve natural resources" | 4. "I feel good about myself when I recycle" | |
|-------------|---------------------|---|---|---|--|--------|
| IAT measure | Pearson correlation | 1 | .031 | -.029 | .076 | .030 |
| 1 | Pearson correlation | .031 | 1 | .452** | .324** | .521** |
| 2 | Pearson correlation | -.029 | .452** | 1 | .804** | .542** |
| 3 | Pearson correlation | .076 | .324** | .804** | 1 | .488** |
| 4 | Pearson correlation | .030 | .521** | .542** | .488** | 1 |

** . Significant at the .01 level (2-tailed).