Development of a New Methodology in Sensory Science to Detect the Intention-Behaviour Gap in Organic Food Consumption and Investigate the Effect of This Gap on Consumer's Subjective Wellbeing

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Submitted by
Diana Ismael

Supervised by
Prof. Dr. Dr. hc. mult. Angelika Ploeger

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This work has been approved by the Faculty of Organic Agricultural Sciences of the University of Kassel as a thesis for acquiring the academic degree of Doktor der Agrarwissenschaften (Dr. agr.).

Supervisor: Prof. Dr. Angelika Ploeger, University of Kassel, Germany
Examiner: Prof. Dr. Christian Herzig, University of Kassel, Germany
Examiner: Prof. Dr. Katrin Zander, University of Kassel, Germany
Examiner: Prof. Dr. Daniel Mörlein, Georg-August-Universität Göttingen, Germany

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List of Abbreviation

AOI	Areas of Interest
CATA	Check all that apply
CES	Consumption Emotion Set
CLT	Central location test
CS	Colour scale
DCS	Dark colour side
DCW	Dark colour wheel
Dec.NE	Negative food-declared emotions
Dec.PE	Positive food-declared emotions
ECA	Emotion-colour association
Eli.NE	Negative food-elicited emotions
Eli.PE	Positive food-elicited emotions
ET	Eye-tracking
GEW	Geneva Emotion Wheel
GNE	General negative emotions
GPE	General positive emotions
IBG	Intention-behaviour gap
IQR	Median and Inter-Quartile Range
KPI	Key Performance Indicator
LCS	Light colour side
LCW	Light colour wheel
LSA	Life Satisfaction Approach
Mdn	Median
NEA	Negative emotion attitude
OIBG	The intention-behaviour gap in organic food consumption
PANAS	Positive and Negative Affect Schedule
PEA	Positive emotion attitude
PS	Pychological questionnaire
RATA	Rate all that apply
SE	Sensory evaluation
SDGs	Sustainable Development Goals
SRQ	Self-reported questionnaire
SWFL	Satisfaction with Food-related Life Scale
SWLS	Satisfaction with Life Scale
TPB	Theory of planned behaviour
TEEBAgriFood	The Economics of Ecosystems and Biodiversity for Agriculture & Food
VEQ	Verbal emotion questionnaire

Preface

Since my bachelor studies, I was always interested in sustainable food systems. Therefore, it was an extremely interesting opportunity for me to have the chance during my master's internship to work with Prof. Dr. Ploeger's team on a subject that goes beyond organic food behaviour and intention-behaviour gap to research consumers' emotions and develop new methods in sensory testing. The work of the team was focused on understanding consumers' behaviour to have a better insight into the factors that lie behind consumers´ food choice and dietary behaviour. Besides, the work explored the intention-behaviour gap in organic food consumption in Germany and other cultures. Until now, the work has resulted in several publications on different topics such as consumers' behaviour applying Theory of Planned Behaviour, the cultural effect in consumers' behaviour, intention-behaviour gap and sustainable food diets. My part of the work was more focused on understanding consumer' behaviour from a more emotional perspective.

During the master's degree, my work was focused on building the initial conceptualization of the new methodology of the colour scale. After that, during my doctoral studies, the methodology was further developed involving the technology of eye-tracking. Besides, new investigations took place on issues that have not been addressed before.
This doctoral dissertation comprises of three published papers in a peer-review scientific journal: *Foods*, with IF (4.092). Moreover, the work presented in Chapter 2 and 3 were honoured with two Prizes of Excellence in Sensory Science for Young Sensory Experts by DGSens: Deutche Gesellschaft für Sensorik at Deutsche Sensoriktage for two consecutive years 2018 and 2019. The work of Chapter 3 was chosen to be of the best 100 research in the global biennial symposium in Sensory Science: 13th Pangborn Sensory Science Symposium. The event had over 1100 delegates. Besides, the results of this doctoral work were presented in 5 scientific conferences between 2017 and 2019 and accepted to be presented in EuroSense 2020, Rotterdam, The Netherlands.

Peer-reviewed articles

- Ismael, D., & Ploeger, A. (2020). The Potential Influence of Organic Food Consumption and Intention-Behaviour Gap on Consumers' Subjective Wellbeing, *Foods*, 9(5), 650. https://doi.org/10.3390/foods9050650
- Ismael, D., & Ploeger, A. (2020). Consumers' Emotion Attitudes towards Organic and Conventional Food: A Comparison Study of Emotional Profiling and Self-Reported Method. *Foods*, 9(1), 79. https://doi.org/10.3390/foods9010079
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Abstract

Current environmental challenges such as global warming, climate change and the loss of biodiversity and natural resources are in one way or another linked to humans' behaviour. Unsustainable production and consumption could explain most of these challenges. This situation encouraged more consumers to be interested in organic food as one way to show their commitment to a more sustainable food behaviour. Consequently, the organic food market has been expanding recently. Notwithstanding, research shows that consumers often express great positive intentions towards organic food, though their actual buying behaviour falls short to these intentions. This is defined as the intention-behaviour gap.

Understanding consumers' attitudes, emotions, perceptions and expectations is highly important and required in the relentless efforts to narrow this gap. Therefore, this doctoral research aimed to (i) develop an innovative method in sensory test to detect implicit food-elicited emotions, (ii) define the best method among different methods to understand the consumers' emotion attitudes towards organic and conventional food and (iii) investigate consumers' perception of the effect of organic food consumption and, more importantly, the intention-behaviour gap in their organic consumption on their subjective wellbeing covering emotional, physical, social and intellectual dimensions. To the best of our knowledge, most of the tackled issues in this work have not been addressed in previous research.

The present study applied mainly two methods: self-reported questionnaires and sensory tests under informed and uninformed conditions employing implicit and explicit measure. This study resulted into important outcomes (i) people use light and dark colours to reveal their positive and negative emotions, (ii) the developed colour scale is a new non-intrusive method that can detect implicit food elicited emotions in sensory evaluation, (iii) consumers changed their attitudes among the different applied methods and (iiii) consumers believed in the positive effect of organic food consumption on their subjective wellbeing, however, they perceived no negative effect for the intention-behaviour gap on their wellbeing.

An important implication of this study is to boost organic food behaviour by understanding consumers' emotions, emphasizing the positive impact of the organic consumption on subjective wellbeing and being aware of how consumers perceive the effect of intention-behaviour gap on their wellbeing. Besides, the results would impact positively organic food marketing and enhance the promotion of organic food behaviour.

Zusammenfassung

Aktuelle Umweltherausforderungen wie die globale Erwärmung, der Klimawandel und der Verlust der biologischen Vielfalt und der natürlichen Ressourcen hängen mit dem Verhalten der Menschen zusammen. Nicht nachhaltige Produktion und Konsum erklären die meisten dieser Herausforderungen. Daher interessieren sich immer mehr Verbraucher für Bio-Lebensmittel, um ihr Engagement für ein nachhaltigeres Lebensmittelverhalten zu demonstrieren. Infolgedessen ist der Markt für Bio-Lebensmittel in letzter Zeit gewachsen. Verbraucher äußern positive Absichten, Bio-Lebensmittel zu kaufen, obwohl ihr Verhalten diesen Absichten nicht entspricht. Dies ist definiert als die Absichts-Verhaltens-Lücke.

Das Verständnis der Einstellungen, Emotionen, Wahrnehmungen und Erwartungen der Verbraucher ist sehr wichtig, um diese Lücke zu verkleinen. Daher zielte diese Doktorarbeit darauf ab, eine neue sensorische Testmethode zu entwickeln, um implizite durch Lebensmittel ausgelöste Emotionen zu erkennen (ii) die beste Methode zu definieren, um die Emotionen der Verbraucher gegenüber biologischen und konventionellen Lebensmitteln zu verstehen (iii) die Auswirkungen von Bio-Lebensmitteln und die Lücke zwischen Absicht und Verhalten auf das subjektive Wohlbefinden der Verbraucher (emotionale, physische, soziale und intellektuelle Dimensionen) zu untersuchen.

In dieser Studie wurden zwei Methoden angewendet: selbst gemeldete Fragebögen und sensorische Tests (unter informierten und nicht informierten Bedingungen) mit impliziten und expliziten Maßnahmen. Diese Studie führte zu wichtigen Ergebnissen. (I) Menschen verwenden helle und dunkle Farben, um ihre positiven und negativen Emotionen zu offenbaren. (Ii) Die entwickelte Farbskala ist eine neue nicht-intrusive Methode, mit der implizite durch Lebensmittel ausgelöste Emotionen bei der sensorischen Bewertung erkannt werden können. (Iii)) Die Verbraucher änderten ihre Einstellung zwischen den verschiedenen angewandten Methoden und (iiii) die Verbraucher glaubten an die positiven Auswirkungen des Konsums von Bio-Lebensmitteln auf ihr subjektives Wohlbefinden, nahmen jedoch keine negativen Auswirkungen auf die Lücke zwischen Absicht und Verhalten auf ihr Wohlbefinden wahr.

Eine wichtige Implikation dieser Studie ist es, die Emotionen der Verbraucher zu verstehen und die positiven Auswirkungen des Bio-Konsums auf das subjektive Wohlbefinden hervorzuheben. Die Ergebnisse könnten sich positiv auf die Vermarktung von Bio-Lebensmitteln auswirken und das Verhalten hin zu Bio-Lebensmitteln fördern.

Chapter 1: General introduction

1.1. Introduction

Current global challenges such as global warming, climate change, and the loss of biodiversity and natural resources are in a great manner linked to human behaviour. Unsustainable production and consumption could explain most of these challenges [1,2]. The United Nations announced in 2015 the 17 "Sustainable Development Goals (SDGs)'' under the Agenda 2030 (UN, 2015) calling for more sustainable life patterns through goals No. 12 and 15. Organic food production is one method that is highly associated with good environmental practices, animal welfare standards, and preserving biodiversity and natural resources [2,3]. Thus, organic food is considered a good example of the global approach to adopt a more sustainable lifestyle [3]. Consumers are becoming more interested in organic food as one way to show their commitment to more sustainable behaviour. Consequently, the organic food market has been expanding recently [4,5]

Different aspects have been considered to be behind the consumer's motives to consume organic food. Health, environment, animal welfare, saving biodiversity, social surroundings and normative beliefs are among the well-known stimuli behind consumers' decision to purchase organic food [6–10]. Recently, more attention has been paid towards the concept of wellbeing as a broad concept that combines physical health, social health, emotions and mood. Researchers have been interested in studying not only the role of wellbeing as an important driver behind organic food consumption but also the effect of organic food consumption on consumers' subjective wellbeing. Likewise, emotions have been proven to play a major role in consumers' food lifestyle and choice. The role of consumers' emotions on their food behaviour and the final choice of organic food has been receiving growing attention throughout the years. Different methods have been developed to measure not only explicit but rather the implicit emotions of consumers. Researchers sought to develop measures that can obtain prompt emotional responses that are beyond conscious control, and which are not affected by social desirability.

Furthermore, studies on sustainable food consumption have been grown considerably during the recent year. However, researchers keep observing that consumers hold positive attitudes or express high intentions to purchase organic food, yet their purchases of organic food do not fulfil those intentions/attitudes [9,11,12], the so-called ''intention-behaviour gap'' and ''attitude-behaviour gap.'' The intention-/attitude-behaviour gap is strongly represented in the market of organic food and it is considered one of the principal challenges for the growth of this market. Therefore, researchers are studying more about this gap trying to understand its causes and effects. Different barriers behind the intention-behaviour gap in organic consumption have been reported in the literature such as price premiums for organic products, which is the prime barrier [13], lack of availability [14,15], knowledge [16,17], trust [18] and emotions [8,19].

Current environmental challenges are encouraging people to adopt better pro-environmental behaviour. As food is an essential part of one's lives, sustainable purchase and consumption are required. Understanding people's real attitudes towards organic food, as one part of the sustainable food system, and extending their awareness of how this type of consumption would affect their emotions, health and wellbeing will help researchers find a more effective way to narrow the gap in the organic food market and promote more sustainability in consumers' lives.

1.2. Background of the Study

1.2.1. Consumers' Attitudes Towards Organic Food

From climate change, water, soil and air pollution to lost waste disposals, people's food habits are one of the leading causes of harm to the earth and the environment.

Consumers have started to become more aware of the importance of a sustainable diet to confront these diet-related harms, not just for the physiological health of the person but the "health" for the whole earth. The adverse impacts on the planet have encouraged more people to increasingly opt for further sustainable consumption habits to meet the need to change [20,21]. Likewise, humans grew deeper concerns for their health and the environment. As, people perceive organic food as a

natural, safe, healthy, and environmentally-friendly product, buying organic food seems to be the favourite option towards more sustainable behaviour [4,22–27].

Different theories, that proposed in the literature, explain consumers' behaviour regarding organic food, such as the Theory of Reasoned Action (TRA) [28] and Theory of Planned Behaviour (TPB) [29]. The theories introduce the behaviour as a result of attitude mediated through intention. The theories also suggest that consumers' attitudes and intentions towards organic food are driven by various factors such as health and environmental consciousness, concern about animal welfare, quality and normative beliefs. However, those factors are ranked differently according to their importance concerning cultural and demographic factors. Consumers' growing interest in organic food is attributed, in general, to different factors such as the credence attributes, which are the features that cannot be tested or experienced even after purchase (e.g. health effect, environmental-friendliness, benefits for animal welfare, pollution impact, the economic resources), search attributes (e.g. price and sensory characteristic that can be evaluated before purchase or consumption) and experience attribute that arise out of the product consumption (e.g. taste, and previous positive experience that may lead to trust). Regardless of those determining factors that encourage consumers' organic behaviour, the theories revealed a discrepancy between the consumers' attitudes/intentions and final behaviour [1,9,12,13]. Consumers generally express positive attitudes towards organic food, yet their final behaviour on the marketplace does not reflect this attitude. This situation is defined as the intention-behaviour gap in organic food consumption (OIBG). Certain barriers were reported to discourage organic food consumption behaviour (Figure 1). Consumers usually face barriers such as price premiums, limited availability, poor quality or sensory attributes, in addition to personal and societal barriers [1,30,31]. Besides, consumers often lack motivation, overall satisfaction, or sufficient information [32] when seeking organic food products. Furthermore, trust is considered one of the important barriers as for some of them the credence attributes of organic food are questionable and the ''Bio'' label may simply be considered a marketing label [27,33].

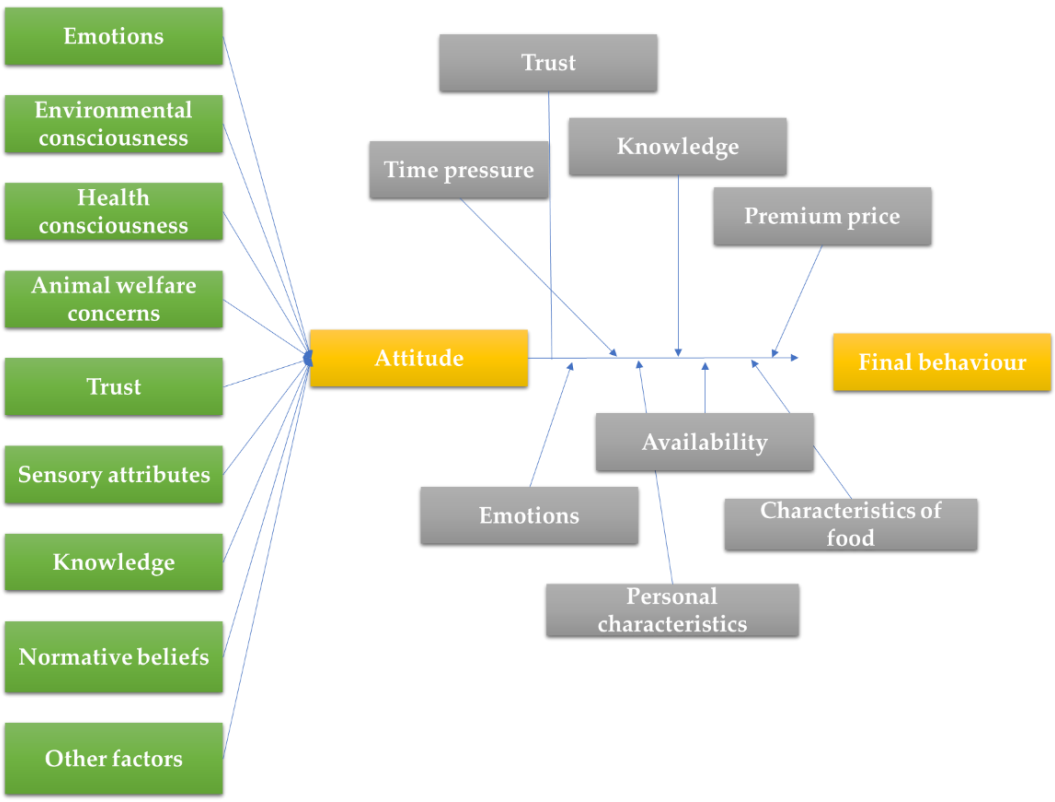

Figure 1. The determinant factors that influence organic food consumption. In green, the factors that encourage organic consumption behaviour, and in grey, the barriers that discourage organic consumption behaviour (authors' design).

Researchers see that purchasing organic food mostly depends on whether the utility of the organic products might compensate for the purchase barriers, and foremost, the higher price [34]. Thus, previous studies demonstrated that environmental- and health-conscious consumers are willing to pay higher prices for organic food as ethical considerations [30,35,36].

1.2.2. Food and Emotions

Is it healthy? Is it cheap? Is it convenient? Researchers spent years explaining consumer's behaviour in food market based on the utility and the benefits obtained from a product. The need to a better conceptualization of consumers' experience with food led sensory and consumer scientists to be more interested in a very important relationship in consumers' final decision, which is the relationship between food and emotions [37–44]. Emotions have been proven to have an essential role in people's judgments, intention to purchase, attitude and final choice of food [41,45–47].

Food consumption is considered a bidimensional hedonic experience. It comprises the emotions that come before the food consumption and influence the food choice and behaviour, besides the emotions that are provoked after the food consumption itself. Emotions have been conceptualized in general as positive and negative, however, researchers have always been interested in specifying deeper levels of emotions. Laros & Steenkamp [46] integrated different research on consumers' emotions provoked by a product to propose a hierarchical model that specifies emotions at three levels. The first level, the superordinate level, consists of the two general emotional dimensions: positive and negative. The second level, the basic emotions, specifies four positive emotions (contentment, happiness, love, and pride) and four negative emotions (sadness, fear, anger, and shame). The third level, the subordinate level, distinguishes among 42 specific emotions based on the Consumption Emotion Set (CES) as illustrated in Figure 2.

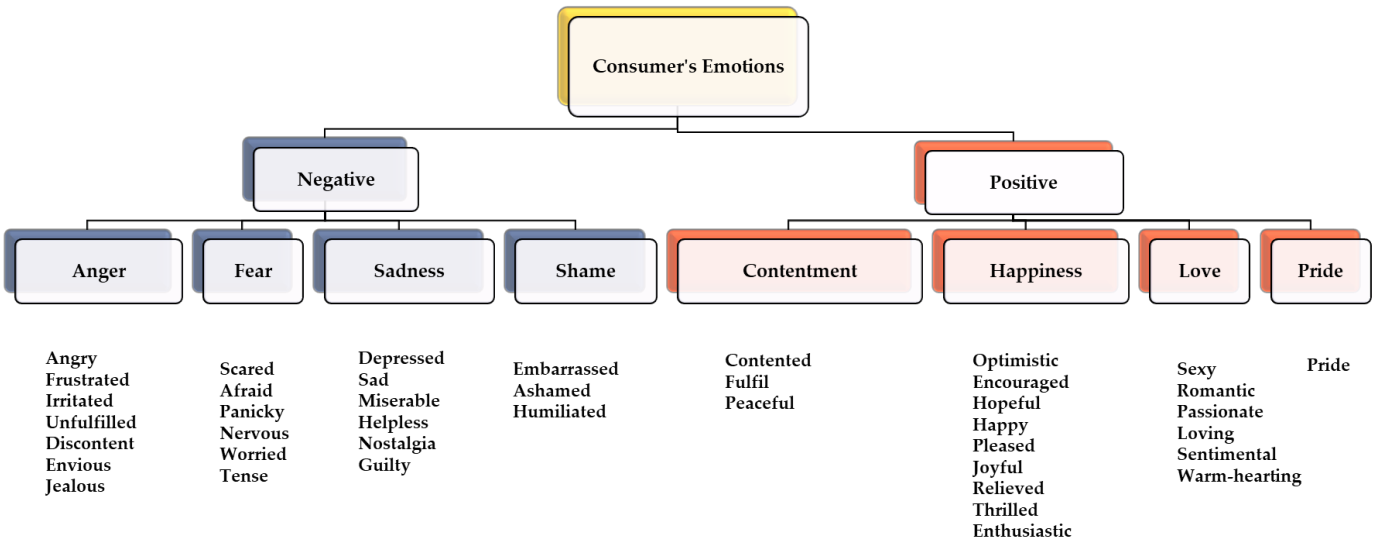

Figure 2. The hierarchal model of consumers' emotions [46] page:1441.

Over the past years, food-related emotions measurement has received growing attention from sensory scientists and food consumption researchers. Various instruments have been developed to measure consumer's implicit and explicit emotion attitudes towards food in general, or a specific food product, with and without food consumption experience [48]. Explicit attitudes are deliberative and intentional actions that operate in conscious mode. The most traditional methods to measure explicit food-related emotions are the verbal or visual self-reported measures by asking participants to declare their emotions and attitudes towards a specific object and with or without a consumption experience. Verbal emotion questionnaires are developed in different languages and use emotional lexicons that comprise a set of emotion terms (or sentences) that vary in their numbers and nature (positive, negative and neutral) [49]. Some of the salient examples of verbal emotion questionnaires are the Consumption Emotion Set (CES) [50] that contains 47 emotions, the Geneva Emotion and

Odour Scale (GEOS) includes 36 emotions[51], the EsSense Profile® contains 39 emotions [44,52], EsSense Profile-25 which is a shortened version of EsSense Profile® with only 25 emotions [49] and ScentMove [53,54]. The visual self-reported tools usually use images instead of words, which is considered easy to comprehend in different languages, such as the Product Emotion Measurement Instrument (PrEmo), and the emoji surveys [55–57]. Some questionnaires ask participants to check all the applicable terms (check-all-that-apply, CATA), while others ask consumers to rate all the applicable term on a scale (rate-all-that-apply, RATA).

A self-reported questionnaire is considered by many researchers easy, fast and user-friendly, yet, other researchers believe that it could be subject to cognitive bias, especially with regards to green consumption due to the social desirability effect and the tendency of the consumers to respond in ways that make themselves seem more ''sustainable'' [42,58,59]. Therefore, implicit measures have been gaining increasing attention. Implicit attitude results from spontaneous (re)action. This (re)action is distinguished as unconscious, unintentional, effortless and fast, which leads to a nondeliberative behaviour and is normally measured by indirect and non-self-reported measures that are mostly subjected to time [60]. Recent studies [59,61–63] were interested more in consumers' implicit emotions and attitudes, particularly towards green products [64,65]. Researchers believe that consumers' behaviour is driven by unconscious positive or negative emotions [66–68]. That is why the development of implicit measures to understand the unconscious mechanism that drives consumer's behaviour is a great deal to many sensory and consumer scientists. Some researchers used facial expressions (FaceReader, nViso, Affidex) [65] and eye movement [69] to investigate implicit attitudes. However, only the facial measurements technology was used during a food test as an implicit measure to study the elicited attitudes during a food consumption experience [68,69]. The Implicit Association Test (IAT) and the Affective Priming Paradigm (APP) are also two of the most well-known methods used to uncover the underlying attitudes towards a subject [70–72].

1.2.2.1. Colour-Emotion Association

Colours are an essential part of our world, and it can have an important impact on our thoughts, emotions and thus final behaviour. The Psychological relationship between colours and emotions have always been an interesting topic for researchers dating back to the middle ages. Colours and emotions are related in a bidimensional relationship. The first dimension is the colour-emotion association, which can be defined by how colours affect humans' emotions. The second dimension is called the emotion-colour association, which can be defined by how people can use colours to express their emotions. The emotion-colour association was rarely studied compared to the first one.

Researchers showed that colours generally carry intrinsic meanings. They investigated in various studies how individuals associated diverse colours to different emotions and suggested an innate functional association between colours and psychological responses [73–84]. Several studies found associations between light colours and positive emotions [80,81,85–89]. For instance, pink was associated with happiness, enjoyment and warmness [87,88,90]; blue was proven to provoke happiness and peacefulness [88]; orange was reported to provoke happiness [91], while white was linked to the feeling of relief [80] and green was associated with hope, excitement and peacefulness [83]. On the other hand, several dark colours were reported to provoke negative emotions like sadness, anxiety, and boredom [82,83,86,88,91]. For example, black provoked sadness in western culture, but in Germany, it referred to fear [80,92]; brown provoked negative emotions such as depressiveness, and dark green was associated with boredom, fear and annoyance [88,91].

Moreover, colours can be generally described with three characteristics: hue, saturation and value (HSV). Changes in the value and saturation level of the same hue can be associated with different emotions [88]. For example, yellow with low value and high saturation revealed emotions such as boring, fearing and annoying, while yellow with medium value and low saturation was associated with cheerful, warm and enjoying [93–96]. The cultural aspect has a significant impact on both colour preferences and individuals' emotions towards the colours [76,88,205-207]. Thus, colours and emotions may have different associations among different cultures. However, the literature on similarities and differences in the colour-emotion association is still mixed. Some studies present the

similarities in specific associations between colours and emotions among several cultures [77, 207], while others present differences and disparities in these associations [85,88].

Food and consumer scientists also paid attention to the role of colours and emotions in the context of food preferences, overall liking and behaviour [97–99]. Researchers investigated the effect of colours on the perception of food and beverages [98]. Additionally, the effect of the colours in consumers' behaviour was studied starting with the influence of the packaging colour on the search and experience attributes of a product (e.g. the expected taste, flavour, and smell of food and beverage products) to the influence of plate colour in a restaurant on the sensorial and hedonic attributes of the food served on this plate [97,99–102].

The second dimension of the association between colours and emotions, the emotion-colour association, is based on the use of colours to express the evoked emotions. Cimbalo et al. [103] and Lawler et al. [104] investigated how children used different colours after provoking positive and negative emotions to express their emotions. The two studies indicated that after watching happy scenes or listening to a happy story, the children used crayons of light colours such as yellow, orange and green to colour their drawing, while they used a dark colour crayon such as brown and black after listening to a sad story or watching a sad scene. Thus, children reflected their positive and negative emotional reactions using light and dark colours.

The common approach of studying the association between colours and emotions in the literature is based on displaying samples of colours to participants then investigating which emotions the colours would evoke. However, the previous two mentioned studies investigated this association differently where the work was based on evoking children´s emotions, then observing how children would reflect their emotions using colours. This opened the door to studying how people could use light and dark colours to report their positive and negative emotions.

1.2.3. Food and Wellbeing

According to the UN Sustainable Development Goals (SDGs) (No 3, No 12) ''ensuring healthy lives and promoting the wellbeing for all at all ages is essential to sustainable development'' [105]. Human's welling has been used as a measure to identify the progress of society [212]. Hence, understanding the individual's wellbeing and determining whether it is improving over time is a core interest for scientists and policymakers.

The concept of wellbeing is a broad concept that involves health, emotions, social and intellectual aspect of a person's life. Literature provides different definitions for the concept of ''subjective wellbeing.'' Some researchers define it as the experience of overall life satisfaction, good health and positive mood and emotions. At the same time, others refer to it as the ''evaluation that people make of their own lives, including happiness, pleasurable emotions, satisfaction with life, and the relative absence of unpleasant emotional states'' [108]. Even though there is still no consensus about specifying a clear definition of subjective wellbeing, wellbeing is identified with several interconnected dimensions: physical, psychological, social, spiritual, occupational, environmental and intellectual [109,110], Figure 3.

Physical dimension involves physical activity, nutrition, lifestyle as well as self-care and vitality [111].
Social dimension involves interaction with others and relationships with the community and the surrounding people [208].
Psychological dimension involves, in particular, the positive emotions, e.g. happiness and satisfaction. Negative emotions are not associated with the term wellbeing [39].
Intellectual dimension involves mental performance, intellectual development [112], thinking ability and personal growth.
Occupational dimension involves the attitude towards personal work. It is measured by people's satisfaction with their work [111].
Environmental dimension involves an individual's concern about the environment as well as the achieved balance between home and work [113].
Spiritual dimension involves the purpose of living and the missions in the future [42].

Figure 3. The dimensions of wellbeing (authors' design).

Some researchers suggested a hierarchical structure of subjective wellbeing that comprises a combination of overall life satisfaction and self-fulfilment, the presence of positive emotions and moods (e.g. contentment, happiness, etc.), and the absence of negative emotions (e.g. depression, anxiety, etc.) [110,114]. Emotions represent the affective evaluation side of wellbeing, while life judgment and satisfaction represent the cognitive evaluation side. Scholars recognize two approaches to identify wellbeing: the *hedonic wellbeing*, which is about happiness, pleasure and having good satisfaction with life, and the *eudaimonic wellbeing*. The eudaimonic term comes from the Greek words ''eu'' means good, and ''daimon'' means spirit. This terminology deals with people's purpose in life and is about pushing oneself beyond the limits to achieve one's beliefs to reach self-development [109].

Human's wellbeing is affected by different factors, some of which related to the policies, economics, social environment, natural environment, personal practices such as food consumption, and healthy activities [209]. The current global health crisis facing the world due to COVID-19 has been affecting people's wellbeing significantly, including their health, social life, emotions and overall life satisfaction in addition to the wellbeing of the planet. This crisis is indeed related to humans' practices. Therefore, many international parties are determined, more than ever, to promote more sustainable practices not only on an individual's level but on an industrial level, as well [209-210].

The concept of wellbeing is receiving growing attention by food researchers as food has been proved to contribute to several functions in consumer's life. It has been known for its strong influence on our mood and emotions as well as our health and life satisfaction [115]. Accordingly, it is believed to have an important association with subjective wellbeing [108]. Block et al. [126] defined subjective wellbeing in the context of food consumption as the consumers' experience of positive physical, psychological, emotional and social outcome as a consequence of a specific type of food consumption. Previous works have also acknowledged the influence of the consumers' perception of food-related wellbeing on their consumption behaviour and final choice.

Plenty studies have shown that consumers seem to associate organic food with different aspects of life such as emotions (happiness, pleasure, satisfaction, etc.), health, social life and personal values such as saving the environment and ensuring animal welfare [11,26,31,101,116–124]. On the other hand, health, as an important dimension of wellbeing, has always been seen as one of the leading factors behind food choice and behaviour, in particular, organic food consumption [7]. Marketers rely on health consciousness as the main factor of attraction that gives organic food the advantages over conventional food in marketing competition. However, current food manufacturers not only seek to

market a ''healthy product'' but rather they promise to provide consumers with food products that make them ''feel better'' in different ways [106,107]. Therefore, the concept of subjective wellbeing is believed to contribute greatly to organic food behaviour [124,125].

Methods to measure food-related subjective wellbeing are diverse and receiving a growing interest recently [39,110,111,113,127–132,211-213]. Some examples of those approaches are The Life Satisfaction Approach (LSA) [213], OECD Better Life Index [211] that was created by the Organisation for Economic Co-operation and Development, The WellSense Profile [39], Well-Being related to Food Questionnaire (Well-BFQ©) [129] and The Satisfaction with Life Scale (SWLS) [215]. As wellbeing is described as a subjective judgment, the self-reported methods are considered the typical way to measure wellbeing [133]. Moreover, to study how food influences subjective wellbeing, diverse strategies have been developed recently, either with questionnaires [112,127,129,131] that use scales to evaluate emotional, social, intellectual, physical and other wellbeing dimensions or with food test experiments using psychological questionnaires to measure mental and physical changes of the body [134,135].

Researchers are paying more attention currently to understand not just the effect of food on consumer's wellbeing, but also to understand the interconnection between subjective wellbeing and the food and agricultural systems as a whole, including production, processing, distribution and consumption activities [209]. With the emergence of wellbeing crisis that resulted from pandemics such as COVID-19, it is crucial to spend significant efforts to reveal the causes of such crisis and seek to solve the consequences to achieve the best of individual subjective wellbeing.

1.3. Objectives and Structure of the Thesis

This doctoral research aims to:

- develop a new non-intrusive method called the colour scale based on emotion-colour association applying the eye-tracking technology and the time-pressure technique to detect implicit emotions.
- apply the developed colour scale in a sensory test as an implicit measure to detect the implicit positive and negative food-elicited emotions.
- investigate the disparity in emotion attitudes towards organic and conventional food comparing three methods; self-reported questionnaire, informed and uninformed food consumption experience by using explicit and implicit (the colour scale) methods.
- explore the influence of consumers' preferences as well as implicit and explicit emotions on their final decision between organic and conventional products under time-pressure.
- study the attitude-behaviour gap in consumers' organic food purchases in daily life and during a lab experiment.
- investigate the potential influence of organic food consumption and, more importantly, the intention-behaviour gap on consumers' subjective wellbeing including the physical, emotional, social and intellectual dimensions.
- examine the differences between the impact of organic food vs. conventional on consumers' mental and physical parameters during a food test.

1.3.1. Problem statements

1.3.1.1 The Development of a Non-intrusive Method to Detect Implicit Emotions

Emotions play a significant role in consumers' food consumption, habits, behaviour and final choice. Studying emotions provides deeper insight beyond overall liking, leads to a better food choice prediction and improves the comprehension of consumer's food experience [52,136–143]. Several studies demonstrated that most people's decisions are initially affected by emotional reactions to some form of stimuli, which guide their attention and lead to final behaviour [101,144]. Besides, previous findings in neuroscience and brain research showed that unconsciousness has a powerful effect on humans' decision-making [145–147]. It was proven that to obtain the optimal decision, it is better to stop thinking. Researchers describe the consciousness as ''capacity-limited'' while the unconsciousness as a ''capacity-unlimited'' that can deliver the optimal decision.

Typically, a consumer's emotion attitude is measured by applying traditional self-reported questionnaires or interviews. However, researchers have been more interested in measuring the unconscious (implicit) emotions than the conscious (explicit) emotions. Berridge and Winkielman [66] reported that ''for an emotion to be unconscious, people must not be able to report their emotional reaction at the moment it is caused. Yet, there must be clear evidence of the emotional reaction in their behaviour or physiological response or subsequent subjective impression of an affect-laden event.'' As respondents' unconscious reaction is described as a fast and associative process that occurs without deliberate conscious, researchers agreed that emotional self-reported questionnaires are not the appropriate methods to capture the unconscious emotions [38,148,149]. Besides, the verbal or non-verbal emotion questionnaire may force the respondent to choose their emotions from a list that does not have an emotion which truly expresses the way they felt during the experiment, which may result in misleading outcomes.

Colours, on the other hand, form an integral part of semiotic and nonverbal communication. Psychologists have found a link between colours and emotions and suggested that colours signal the brain directly to trigger an effective reaction and present an innate functional association between colour and psychological responses. The colour-emotion association, which is the emotions trigged by samples of colours, has been studied in-depth in some research. Different from this common approach, this study tries to formulate a deep comprehension of the other dimension of the association between colours and emotions, which is how to use colours to express provoked emotions. This latter approach, which will be referred to in this study as the emotion-colour association, has rarely been studied before.

The eye-tracking technique is a technology that gives accurate data about the individual's eye movement and fixation on a specific target. It has been used by scientists as an unobtrusive reliable tool to capture the non-cognitive reaction during an experiment [150,151]. It registers the prompt responses without the need for any type of communication such as writing, reading or speaking. Furthermore, literature reports that one of the most important methods to obtain intuitive responses and understand the innate behaviour is a time-pressure technique [150,152]. Thus, time-pressure together with eye-tracking technology has been considered a powerful implicit measure. The present study applied this measure to have a better insight into the implicit emotion-colour association. This work used the eye-tracker to capture the rapid intuitive eye movement and fixation on a graded panel of light and dark colours after displaying an emotional stimulus under time pressure. The aim was to reduce the conscious impact, avoid the deliberate action by the participants and obtain implicit responses with the minimal conscience-based decision [150]. None of the current methods of measuring emotions has applied the eye-tracking technology considering the association between emotions and colours to underline how respondents would express their positive and negative emotions with light and dark. Therefore, our study is the first to employ each of the emotion-colour association, eye-tracking and time-pressure to develop a non-intrusive tool called ''the colour scale'' to measure the implicit emotions. Also, this work carried out a self-reported questionnaire as an explicit method to investigate the explicit emotion-colour association.

Moreover, during a sensory test, consciousness receives only a small part of the sensory input [153], and only this small part is available to be measured in a sensory test using a classical verbal or nonverbal questionnaires. Besides, a traditional emotion questionnaire may lead the assessors while using the questionnaire to experience an emotion that was not evoked during the test. Therefore, the importance of applying new methods that can detect the implicit emotions directly after the food test while avoiding any type of thinking process, reading, writing or pointing out specific emotion terms, has arisen during the years [65]. Our work intended to combine the colour scale, as an implicit measure, in addition to the typical verbal emotion questionnaire, as an explicit measure, to have the best comprehension on consumer's emotion attitudes towards organic and conventional food during a food consumption experience.

1.3.1.2. The Comparison of Different Methods to Detect Consumer's Emotion Attitudes

The growth in consumers' concerns about health and state of the environmental issues has raised the need to live more sustainably [123]. Emotions were proven to have a significant effect on

consumers' sustainable and ethical consumption behaviour [216]. Fear, sadness, guilt, sympathy, pride, enthusiasm, happiness, optimism are all emotions that were related to organic food consumption [184,191,192]. However, previous research reports that when it comes to organic food, declared attitudes tend to be overly positive [11,19,154]. There is a clear disparity between the declared attitudes in self-reported methods and the observed behaviour with regards to organic food consumption in the literature. So, what could be the reason behind this disparity? The clearest answer to this question could be that the self-reported methods that are being used to measure consumers' attitudes are not sufficient to reflect the real underlying attitudes, thus, they are not good predictors of consumers' actual behaviour [1,155]. This could be attributed to different reasons. First, it could be that the questions and statements in the self-reported questionnaire could have a leading effect, which encourages the participants to respond in the best way that makes them look good [157]. Second, people are more comfortable to hide their real attitudes and overstate their positive attitudes and intentions to buy organic food to impress the researcher, which represents the social desirability tendencies in surveys [61]. The individual who adopts a more sustainable lifestyle is perceived as a knowledgeable, selfless and purposeful person. Therefore, participants tend to appear more pro-organic among the different studies. Participants believe that declaring stronger attitudes towards organic food complies more with the acceptable social norms [19,58,59,156].

On the other hand, it should be mentioned that apart from the problem of social desirability in surveys, several barriers that complicate the organic food purchase have been discussed [5,7,25,31,123]. For instance, consumers may not be able to afford the premium price of the organic product they intended to buy, or the product they want is simply not available at that time, or the competing conventional product may be promoted or marketed in a stronger attractive manner, etc. This research tried to explore these barriers from the consumer's perception.

Numerous studies have been conducted to explore consumer's attitudes towards organic and conventional food. However, few studies have investigated consumers' attitudes towards organic and conventional food applying different methods in the interest of verifying the best method. This work is the first to compare the differences in consumers' attitudes towards organic and conventional food among three types of measures: (1) self-reported measure, (2) sensory test under informed condition and (3) sensory test under uninformed condition, using both explicit and implicit methods (the developed colour scale) to explore the best measure that detects the real consumer's attitudes.

1.3.1.3. The effect of Organic Food Consumption and the Related Intention-Behaviour Gap (OIBG) On Subjective Wellbeing

OIBG is considered a real problem that composes more challenges to the environmentally-friendly food market and the promotion towards more sustainable consumption. It results from a misunderstanding of the consumer's perceptions, expectations and needs of the organic food market [123,158]. While previous studies have addressed vastly the existence of the intention–behaviour gap and its drivers, it seems that none have been performed to research how this gap affects the subjective wellbeing of the consumers who do not act upon their attitudes.

Wellbeing is a state of being happy, healthy, purposeful and overall satisfied with your life [159]. Each one of the wellbeing aspects (health, emotions, society, intellectuality and satisfaction) has been acknowledged among the most important aspects that people seek when tending towards sustainable consumption. Wellbeing together with its dimensions has been studied as a motivational factor more than as a consequential aspect.

The effect of food choice on consumers' health and emotions was reported by several researchers [134,160,161]. This influence is nowadays well-known to experts and most consumers as well [162]. On the other hand, compared to the literature that investigates the effect of organic food on health and emotions, there is a paucity of literature addressing the influence of organic food consumption on wellbeing as a whole. Our study tackles the question of how would consumers perceive the effect of organic food consumption and, more importantly, the organic intention-behaviour gap on their subjective wellbeing?

Although the effect of organic food consumption on subjective wellbeing has been previously studied, this work, to the best of our knowledge, is the first to study the impact of OIBG on consumers' wellbeing considering the physical, emotional, social and intellectual aspect of their lives.

This study follows the traditional method of studying subjective wellbeing, which is the self-reported questionnaires and depends on different items adopted from previously developed surveys [112,127,135,163]. Besides, the study extends its investigation to explore whether consumers feel any differences between the effect of organic vs. conventional food on their wellbeing parameters during a food consumption experience applying a recent developed psychological questionnaire [134].

The lack of research that studies the effect on the intention-behaviour gap on the consumers' health could be one of the factors that hinder the efforts to narrow this gap. New studies are now required to highlight the effect of this gap on the consumers' wellbeing. Consequently, when the consumers are more aware of how the OIBG is affecting their physical, emotional, social and intellectual wellbeing they would be more motivated to overcome this gap and will eventually encourage them to choose organic food.

1.3.2. The structure of the thesis

The structure of the thesis is as follows:

Chapter 1 presents the literature on organic food consumption, consumers' attitudes toward this consumption and factors and drivers behind this behaviour. It also discusses the problem statements and the importance of this doctoral work clarifying the questions and hypothesis of the thesis.

Chapter 2 presents the first original publication that discusses the developing of the new method (the colour scale) and how it was applied in a sensory test.

Chapter 3 presents the second publication on choosing the best methodology to understand the consumers' underlying attitudes toward organic and conventional.

Chapter 4 presents the third publication on the effect of organic food consumption and the intention-behaviour gap on consumers' wellbeing.

Chapter 5 presents the general discussion of the results of this doctoral work. It also addresses the scientific contribution of the work and its limitations and recommendation for future research.

Chapter 6 demonstrates the full list of the bibliography of the thesis

1.4. Materials and Methods

This doctoral research was conducted based on an interdisciplinary research approach. It consists of innovative and creative methods, social science research methods as well as sensory evaluation methods.

The study depended on self-reported questionnaires (SRQ) and sensory evaluations implementing explicit and implicit measures to have a better insight into consumers' expectations and perceptions. The surveys were web-based while the sensory evaluation was conducted at a central location (the sensory laboratory of Kassel University and Fulda University of Applied Science). Additionally, eye-tracking technology was implemented to capture the dwell time of participant's eye fixation with a screen-based eye-tracker tool (SMI RED-250 mobile) manufactured by SensoMotoric Instruments, SMI Germany). RED-250 mobile is a fully portable, screen-based eye-tracker. Table (1) demonstrates the study methods and material characteristics.

SRQ consisted of statements and questions with the option of both check-all-that-apply (CATA) and rate-all-that-apply (RATA). Furthermore, during the sensory tests, different food samples were used. The samples were chosen from different categories of food products such as snacks, drink, fruit, herbs, vegetables and bakeries. The samples were common, easily available in the supermarkets and known for their good level of acceptance. Organic and conventional food samples of the same

product were served in each test. Four sensory tests were conducted: taste, smell, visual and touch tests.

The collected data were analysed using the Statistical Package for Social Sciences (IBM, SPSS Statistics, version 24) and the sensory software of RedJade® Sensory Solutions, LLC (Martinez, CA). Statistical tests for parametric and nonparametric data were used such as Descriptive analysis (Median and Mean), ANOVA, Chi-square, Fisher's exact test, Wilcoxon signed-rank test, Spearman's rho test, Mann-Whitney U test, Kruskal-Wallis test, Generalized linear model and Inter-Quartile Range (IQR). All significance tests were done at a significance level of 5%. Chapters 2, 3 and 4 contain detailed sections on data collections and statistical analysis tests. All experiments and survey started only after the participant consented to take part.

Table 1. A general overview of study characteristics categorized per method, type of the measurement, instrument, setting and chapter.

Item		Method/ Instrument	Type of measure		Chapter
The influence of light and dark colours on participants' emotions using a list of 23 emotion terms	Survey	SRQ	Explicit	Web-based	2
Using samples of colours to express evoked emotions	Survey	SRQ	Explicit	Web-based	2
Using a graded panel of light and dark colours to express the evoked emotions	LE	ET	Implicit	CLT	2
The feature of the food that evoked positive/negative emotion(s): healthy, environmentally friendly, and tasty	Survey	SRQ	Explicit	Web-based	2
Measuring food-elicited emotions	SE	SRQ	Explicit	CLT	2 and 3
		CS & ET	Implicit	CLT	2 and 3
Measuring food-related emotions	Survey	SRQ	Explicit	CLT	3
Consumers' underlying choice under time pressure	LE	RFCT	Implicit	CLT	3
Organic food purchase actual behaviour	Survey	SRQ	Explicit	CLT/ Web-based	3 and 4
Organic food purchase intentions	Survey	SRQ	Explicit	CLT/ Web-based	3 and 4
Factors influencing organic food consumption behaviour	Survey	SRQ	Explicit	Web-based	3 and 4
Causes of OIBG	Survey	SRQ	Explicit	Web-based	3 and 4
The influence of organic food consumption on subjective wellbeing including four dimensions: social, emotional, physical and intellectual.	Survey	SRQ	Explicit	Web-based	4
The influence of OIBG on subjective wellbeing in general	Survey	SRQ	Explicit	CLT/ Web-based	3 and 4
The influence of OIBG on subjective wellbeing including four dimensions: social, emotional, physical and intellectual.	Survey	SRQ	Explicit	Web-based	4
The influence of organic and conventional food on the body's mental and physical parameter	FT	PQ	Explicit	CLT	4

CLT: central location test, SRQ: self-reported questionnaire, SE: sensory evaluation, LE: lab experiment
CS: colour scale, ET: eye-tracking, FT: food test, PQ: psychological questionnaire, RFCT: rapid forced-choice test

References

1. Terlau, W.; Hirsch, D. Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon-Causes and Measurements towards a Sustainable Development. *Int. J. Food Syst. Dyn.* 2015, *6*, 159–174.
2. Feulner, G. Global Challenges: Climate Change. *Glob. Challenges* 2017, *1*, 5–6.
3. Antje Risius, U.H. Consumer segmentation based on attitudes - Does information change it all? 2017, *2*, 229–235.
4. Singh, A.; Verma, P. Factors influencing Indian consumers' actual buying behaviour towards organic food products. *J. Clean. Prod.* 2017, *167*, 473–483.
5. Joshi, Y.; Rahman, Z. Investigating the determinants of consumers' sustainable purchase behaviour. *Sustain. Prod. Consum.* 2017, *10*, 110–120.
6. Qasim, H.; Yan, L.; Guo, R.; Saeed, A.; Ashraf, B.N. The defining role of environmental self-identity among consumption values and behavioural intention to consume organic food. *Int. J. Environ. Res. Public Health* 2019, *16*.
7. Ahmad, S.N.B.; Juhdi, N. Consumer's perception and purchase intentions towards organic food products: exploring the attitude among Malaysian consumers. *16th Annu. Conf. Pacific Basin Financ. Econ. Account. Manag.* 2008, *6*, 1–15.
8. Padilla Bravo, C.; Cordts, A.; Schulze, B.; Spiller, A. Assessing determinants of organic food consumption using data from the German National Nutrition Survey II. *Food Qual. Prefer.* 2013, *28*, 60–70.
9. Aschemann-Witzel, J.; Niebuhr Aagaard, E.M. Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and in-store food choice. *Int. J. Consum. Stud.* 2014, *38*, 550–558.
10. Josephine, P.; Ritsuko, O. Pro-environmental products: marketing influence on consumer purchase decision. *J. Consum. Mark.* 2008, *25*, 281–293.
11. Vermeir, I.; Verbeke, W. Sustainable food consumption: Exploring the consumer "attitude - Behavioural intention" gap. *J. Agric. Environ. Ethics* 2006, *19*, 169–194.
12. Sultan, P.; Tarafder, T.; Pearson, D.; Henryks, J. Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: moderating roles of communication, satisfaction and trust in organic food consumption. *Food Qual. Prefer.* 2020, *81*, 103838.
13. Aschemann-Witzel, J.; Zielke, S. Can't Buy Me Green? A Review of Consumer Perceptions of and Behaviour Toward the Price of Organic Food. *J. Consum. Aff.* 2017, *51*, 211–251.
14. Buder, F.; Feldmann, C.; Hamm, U. Why regular buyers of organic food still buy many conventional products: Product-specific purchase barriers for organic food consumers. *Br. Food J.* 2014, *116*, 390–404.
15. Zagata, L. Consumers' beliefs and behavioural intentions towards organic food. Evidence from the Czech Republic. *Appetite* 2012, *59*, 81–89.
16. Justin, P.; Jyoti, R. Consumer behaviour and purchase intention for organic food. *J. Consum. Mark.* 2012, *29*, 412–422.
17. Díaz, F.J.M.; Pleite, F.M.C.; Paz, J.M.M.; García, P.G. Consumer knowledge, consumption, and willingness to pay for organic tomatoes. *Br. Food J.* 2012, *114*, 318–334.
18. Perrini, F.; Castaldo, S.; Misani, N.; Tencati, A. a Study of Italian Consumers. *Bus. Strateg. Environ.* 2010, *526*, 512–526.
19. Carrington, M.J.; Neville, B.A.; Whitwell, G.J. Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *J. Bus. Ethics* 2010, *97*, 139–158.

20. Vega-Zamora, M.; Parras-Rosa, M.; Torres-Ruiz, F.J. You Are What You Eat: The Relationship between Values and Organic Food Consumption. *Sustainability* 2020, *12*, 3900.
21. Savarese, M.; Chamberlain, K.; Graffgna, G. Co-creating value in sustainable and alternative food networks: The case of community supported agriculture in New Zealand. *Sustain.* 2020, *12*.
22. C. Gan, C. Zhiyou, M.C. Tran, D. A. Cohen, W.X. *Consumer attitudes towards the purchase of organic products in China.* Econ. 2016, 15, 117–144.
23. Nikodemska-Wolowik, A.M. Organic farming brand identity: meeting trends, building trust. *Pecvnia Rev. la Fac. Ciencias Económicas y Empres. Univ. León* 2009, *8*, 263.
24. Van Loo, E.; Caputo, V.; Nayga Rodolfo M., J.; Meullenet, J.-F.; Crandall, P.G.; Ricke, S.C. Effect of Organic Poultry Purchase Frequency on Consumer Attitudes Toward Organic Poultry Meat. *J. Food Sci.* 2010, *75*.
25. Sylwia, Ż. Polish consumer food choices and beliefs about organic food. *Br. Food J.* 2011, *113*, 122–137.
26. Manuela Vega-Zamora, Francisco Jos´e Torres-Ruiz, Eva Mª Murgado-Armenteros, and M.P.-R. Organic as a Heuristic Cue: What Spanish Consumers Mean by Organic Foods. *Psychol. Mark.* 2014, *31*, 349–359.
27. Rong-Da, L. Predicting intentions to purchase organic food: the moderating effects of organic food prices. *Br. Food J.* 2016, *118*, 183–199.
28. Fishbein, Martin, and I.A. Belief, attitude, intention, and behaviour: An introduction to theory and research. *Reading, MA Addison-Wesley*. 1977.
29. Ajzen, I. The theory of planned behaviour. *Organ. Behav. Hum. Decis. Process.* 1991, *50*, 179–211.
30. Asif, M.; Xuhui, W.; Nasiri, A.; Ayyub, S. *Determinant factors influencing organic food purchase intention and the moderating role of awareness: A comparative analysis*; Elsevier, 2018; Vol. 63, 144-163.
31. Bryła, P. Organic food consumption in Poland: Motives and barriers. *Appetite* 2016, *105*, 737–746.
32. Pham, T.H.; Nguyen, T.N.; Phan, T.T.H.; Nguyen, N.T. Evaluating the purchase behaviour of organic food by young consumers in an emerging market economy. *J. Strateg. Mark.* 2019, *27*, 540–556.
33. Nuttavuthisit, K.; Thøgersen, J. The Importance of Consumer Trust for the Emergence of a Market for Green Products: The Case of Organic Food. *J. Bus. Ethics* 2017, *140*, 323–337.
34. Schaack, Diana, and H.W. The World of Organic Agriculture. In Proceedings of the world of organic agriculture statistics and emerging trends; Bonn: IFOAM, Frick: FIB, 2010; pp. 141–144.
35. Kapuge, K.D.L.R. Determinants of Organic Food Buying Behaviour: Special Reference to Organic Food Purchase Intention of Sri Lankan Customers. *Procedia Food Sci.* 2016, *6*, 303–308.
36. Biswas, A.; Roy, M. Leveraging factors for sustained green consumption behaviour based on consumption value perceptions: testing the structural model. *J. Clean. Prod.* 2015, *95*, 332–340.
37. Spinelli, S.; Masi, C.; Zoboli, G.P.; Prescott, J.; Monteleone, E. Emotional responses to branded and unbranded foods. *Food Qual. Prefer.* 2015, *42*, 1–11.
38. Tseng, K.C. Behavioural finance, bounded rationality, neuro-finance, and traditional finance. *Invest. Manag. Financ. Innov.* 2006, *3*, 7–18.
39. King, S.C.; Snow, J.; Meiselman, H.L.; Sainsbury, J.; Carr, B.T.; McCafferty, D.; Serrano, D.; Gillette, M.; Millard, L.; Li, Q. Development of a questionnaire to measure consumer wellness associated with foods: The WellSense Profile™. *Food Qual. Prefer.* 2015, *39*, 82–94.
40. Antonetti, P.; Maklan, S. Feelings that Make a Difference: How Guilt and Pride Convince Consumers of the Effectiveness of Sustainable Consumption Choices. *J. Bus. Ethics* 2014, *124*, 117–134.
41. Lockie, S.; Lyons, K.; Lawrence, G.; Grice, J. Choosing organics: A path analysis of factors underlying the selection of organic food among Australian consumers. *Appetite* 2004, *43*, 135–146.
42. Goetzke, B.; Nitzko, S.; Spiller, A. Consumption of organic and functional food. A matter of well-being

and health? *Appetite* 2014, *77*, 96–105.

43. Jiang, Y.; King, J.M.M.; Prinyawiwatkul, W. A review of measurement and relationships between food, eating behaviour and emotion. *Trends Food Sci. Technol.* 2014, *36*, 15–28.
44. King, S.C.; Meiselman, H.L. Development of a method to measure consumer emotions associated with foods. *Food Qual. Prefer.* 2010, *21*, 168–177.
45. Sørensen, J. *Measuring Emotions in a Consumer decision-making Context – Approaching or Avoiding by Approaching or Avoiding*; 2008; ISBN 9788791646249.
46. Laros, F.J.M.; Steenkamp, J.B.E.M. Emotions in consumer behaviour: A hierarchical approach. *J. Bus. Res.* 2005, *58*, 1437–1445.
47. Macht, M. How emotions affect eating: A five-way model. *Appetite* 2008, *50*, 1–11.
48. Meiselman, H.L. *Emotion Measurement*; Meiselman, H.L.B.T.-E.M., Ed.; Woodhead Publishing, 2016; ISBN 978-0-08-100508-8.
49. Nestrud, M.A.; Meiselman, H.L.; King, S.C.; Lesher, L.L.; Cardello, A. V. Development of EsSense25, a shorter version of the EsSense Profile®. *Food Qual. Prefer.* 2016, *48*, 107–117.
50. Richins, M.L. Measuring Emotion in Consumption Experience. *J. Consum. Res.* 1997, *24*, 127–146.
51. Chrea, C.; Grandjean, D.; Delplanque, S.; Cayeux, I.; Le Calvé, B.; Aymard, L.; Velazco, M.I.; Sander, D.; Scherer, K.R. Mapping the Semantic Space for the Subjective Experience of Emotional Responses to Odors. *Chem. Senses* 2008, *34*, 49–62.
52. King, S.C.; Meiselman, H.L.; Carr, B.T. Measuring emotions associated with foods in consumer testing. *Food Qual. Prefer.* 2010, *21*, 1114–1116.
53. Porcherot, C.; Delplanque, S.; Raviot-Derrien, S.; Calvé, B.L.; Chrea, C.; Gaudreau, N.; Cayeux, I. How do you feel when you smell this? Optimization of a verbal measurement of odour-elicited emotions. *Food Qual. Prefer.* 2010, *21*, 938–947.
54. Porcherot, C.; Delplanque, S.; Planchais, A.; Gaudreau, N.; Accolla, R.; Cayeux, I. Influence of food odorant names on the verbal measurement of emotions. *Food Qual. Prefer.* 2012, *23*, 125–133.
55. Desmet, P. Development and application of an instrument to measure emotional responses to products. *Funology. Springer, Dordrecht,* 2003, 111–123.
56. Vidal, L.; Ares, G.; Jaeger, S.R. Use of emoticon and emoji in tweets for food-related emotional expression. *FOOD Qual. Prefer.* 2016, *49*, 119–128.
57. Jaeger, S.R.; Lee, S.M.; Kim, K.-O.O.; Chheang, S.L.; Jin, D.; Ares, G. Measurement of product emotions using emoji surveys: Case studies with tasted foods and beverages. *Food Qual. Prefer.* 2017, *62*, 46–59.
58. Steenkamp, Jan-Benedict EM, M.G.D.J.; Baumgartner., H. Socially Desirable Response Tendencies in Survey Research. *J. Mark. Res.* 2010, *47*, 199–214.
59. Beattie, G.; Sale, L. Shopping to Save the Planet? Implicit Rather than Explicit Attitudes Predict Low Carbon Footprint Consumer Choice. *Int. J. Environ. Cult. Econ. Soc. Sustain. Annu. Rev.* 2011, *7*, 211–232.
60. Wilson, T.D.; Lindsey, S.; Schooler, T.Y. A Model of Dual Attitudes. *Psychol. Rev.* 2000, *107*, 101–126.
61. Beattie, G.; McGuire, L. See no evil? Only implicit attitudes predict unconscious eye movements towards images of climate change. *Semiotica* 2012, *2012*, 315–339.
62. Lagast, S.; Gellynck, X.; Schouteten, J.J.; De Herdt, V.; De Steur, H. Consumers' emotions elicited by food: A systematic review of explicit and implicit methods. *Trends Food Sci. Technol.* 2017, *69*, 172–189.
63. Vantomme, D.; Maggie, G.; Houwer, J. De; Pelsmacker, P. De Implicit Attitudes Toward Green Consumer Behaviour. *Psychol. Belg.* 2005, *45*, 217–239.
64. Greenwald, A.G.; Poehlman, T.A.; Uhlmann, E.L.; Banaji, M.R. Understanding and Using the Implicit Association Test: III. Meta-Analysis of Predictive Validity. *J. Pers. Soc. Psychol.* 2009, *97*, 17–41.

65. Danner, L.; Sidorkina, L.; Joechl, M.; Duerrschmid, K. Make a face! Implicit and explicit measurement of facial expressions elicited by orange juices using face reading technology. *Food Qual. Prefer.* 2014, *32*, 167–172.
66. Winkielman, P.; Berridge, K.C. Unconscious Emotion. *Am. Psychol. Soc.* 2004, *13*, 120–123.
67. Köster, E.P.; Mojet, J. From mood to food and from food to mood: A psychological perspective on the measurement of food-related emotions in consumer research. *Food Res. Int.* 2015, *76*, 180–191.
68. Köster, E.P. Diversity in the determinants of food choice: A psychological perspective. *Food Qual. Prefer.* 2009, *20*, 70–82.
69. Kostyra, E.; Wasiak-Zys, G.; Rambuszek, M.; Waszkiewicz-Robak, B. Determining the sensory characteristics, associated emotions and degree of liking of the visual attributes of smoked ham. A multifaceted study. *LWT - Food Sci. Technol.* 2016, *65*, 246–253.
70. Greenwald, A.G.; McGhee, D.E.; Schwartz, J.L. Measuring individual differences in implicit cognition: the implicit association test. *J. Pers. Soc. Psychol.* 1998, *74*, 1464–80.
71. Sachs, M.E.; Damasio, A.; Habibi, A. The pleasures of sad music: a systematic review. *Front. Hum. Neurosci.* 2015, *9*, 1–12.
72. Klauer, K.C.; Musch, J. Affective priming: Findings and theories. The psychology of evaluation: Affective processes in cognition and emotion. *Psychol. Press. 2003* 2003, 432.
73. Abril, P.S.; Olazábal, A.M.; Cava, A. Marketing and the Law. *J. Acad. Mark. Sci.* 2009, *37*, 375–380.
74. Hettiarachchi, A. a; De Silva, N. Colour associated emotional and behavioural responses: A study on the associations emerged via imagination. *Built-Environment Sri Lanka* 2012, *11*, 21–27.
75. Dael, N.; Perseguers, M.N.; Marchand, C.; Antonietti, J.P.; Mohr, C. Put on that colour, it fits your emotion: Colour appropriateness as a function of expressed emotion. *Q. J. Exp. Psychol.* 2016, *69*, 1619–1630.
76. Hanada, M. Correspondence analysis of colour–emotion associations. *Colour Res. Appl.* 2018, *43*, 224–237.
77. Ou, L.C.; Luo, M.R.; Woodcock, A.; Wright, A. A study of colour emotion and colour preference. Part III: Colour preference modelling. *Colour Res. Appl.* 2004, *29*, 381–389.
78. Gil, S.; Bigot, L. Le SHORT REPORT Colour and emotion: children also associate red with negative valence. 2016, *6*, 1087–1094.
79. Toronto Star Psychology of Colour. 2005, 1–4.
80. Vainio, S.H. A cross-cultural comparison of colour-emotion associations of Finland, Norway, China and Greece. 2016.
81. Hemphill, M. A note on adults' colour–emotion associations. *J. Genet. Psychol.* 1996, *157*, 275–280.
82. Kaya, N.; Crosby, M. Colour associations with different building types: An experimental study on American college students. *Colour Res. Appl.* 2006, *31*, 67–71.
83. Kaya, N.; Epps, H.H. Colour-Emotion Associations: Past Experience and Personal Preference. In Proceedings of the AIC 2004 Colour and Paints, Interim Meeting of the International Colour Association; Brazil, 2004; Vol. 5, pp. 31–34.
84. Sutton, T.M.; Altarriba, J. Colour associations to emotion and emotion-laden words: A collection of norms for stimulus construction and selection. *Behav. Res. Methods* 2016.
85. Bortoli, M. De; Maroto, J. Colours Across Cultures: Translating Colours in Interactive Marketing Communications. In Proceedings of the Elicit 2001: Proceedings of the European Languages and the Implementation of Communication and Information Technologies (Elicit) conference; UK: Paisley University Language Press, 2001; pp. 3–4.
86. Boyatzis, C.J.; Varghese, R. Children's emotional associations with colours. *J. Genet. Psychol.* 1994, *155*,

77–85.

87. Gil, S.; Le Bigot, L. Seeing life through positive-tinted glasses: Colour-meaning associations. *PLoS One* 2014, *9*.
88. Manav, B. Colour-emotion associations and colour preferences: A case study for residences. *Colour Res. Appl.* 2007, *32*, 144–150.
89. Kaya, N.; Epps, H.H.; Hall, D. Relationship Between Colour and Emotion: A Study of College Students. *Coll. Student J* 1998, *38*, 396–406.
90. Gilg, A.; Barr, S.; Ford, N. Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures* 2005, *37*, 481–504.
91. Manav, B. Colour-emotion associations, designing colour schemes for urban environment-architectural settings. *Colour Res. Appl.* 2017, 631–640.
92. Hupka, R. B., Zaleski, Z., Otto, J., Reidl, L., & Tarabrina, N. V The colours of anger, envy, fear, and jealousy: A cross-cultural study. *J. Cross. Cult. Psychol.* 1997, *28*, 156–171.
93. Fraser, T.; Banks, A. *Designer's colour manual: The complete guide to colour theory and application*; Chronicle Books, 2004;
94. Wilms, L.; Oberfeld, D. Colour and emotion: effects of hue, saturation, and brightness. *Psychol. Res.* 2017, 1–19.
95. Kwallek, N.; Lewis, C.M.; Lin-Hsiao, J.W.D.; Woodson, H. Effects of nine monochromatic office interior colours on clerical tasks and worker mood. *Colour Res. Appl.* 1996, *21*, 448–458.
96. Valdez, P.; Mehrabian, A. Effects of Colour on Emotions. *J. Exp. Psychol. Gen.* 1994, *123*, 394–409.
97. Schmidt, V.; Schaefer, H.M. Unlearned preference for red may facilitate recognition of palatable food in young omnivorous birds. *Evol. Ecol. Res.* 2004, *6*, 919–925.
98. Gilbert, A.N.; Fridlund, A.J.; Lucchina, L.A. The colour of emotion: A metric for implicit colour associations. *Food Qual. Prefer.* 2016, *52*, 203–210.
99. Spence, C.; Levitan, C.A.; Shankar, M.U.; Zampini, M. Does food colour influence taste and flavour perception in humans? *Chemosens. Percept.* 2010, *3*, 68–84.
100. Spence, C.; Velasco, C. On the multiple effects of packaging colour on consumer behaviour and product experience in the 'food and beverage' and 'home and personal care' categories. *Food Qual. Prefer*. 2018, 68, 226–237.
101. Rizzato, M. How Emotions and Social Interaction Affect Our Food Experience, 2016.
102. Piqueras-Fiszman, B.; Giboreau, A.; Spence, C. Assessing the influence of the colour of the plate on the perception of a complex food in a restaurant setting. *Flavour* 2013, *2*, 1–11.
103. Cimbalo, R.S.; Beck, K.L.; Sendziak, D.S. Emotionally toned pictures and colour selection for children and college students. *J. Genet. Psychol.* 1978, *133.2*, 303–304.
104. Lawler, C.O.; Lawler III EE Colour-mood associations in young children. *J. Genet. Psychol.* 1965, *107*, 29–32.
105. United Nations. Sustainable Development Goals. 2016. Retrieved from: http://www.un.org/sustainabledevelopment/sustainable-development-goals (accessed on 12/06/2020).
106. Ryff, C.D.; Keyes, C.L.M. The Structure of Psychological Well-Being Revisited. *J. Personal. Soc. Psychol.* 1995, *69*, 719–727.
107. Frank M. Andrews, S.B.W. *Social Indicators of Well-Being: Americans' Perceptions of Life Quality*; illustrate.; Springer Science & Business Media, 2012.
108. Schnettler, B.; Miranda, H.; Sepúlveda, J.; Denegri, M.; Mora, M.; Lobos, G.; Grunert, K.G. Psychometric properties of the satisfaction with food-related life scale: Application in Southern Chile. *J. Nutr. Educ.*

Behav. 2013, *45*, 443–449.

109. Dodge, R.; Daly, A.; Huyton, J.; Sanders, L. The challenge of defining wellbeing. *Int. J. Wellbeing* 2013, *2*, 222–235.
110. Diener, E.; Oishi, S.; Lucas, R.E. Personality, culture, and subjective well-being: emotional and cognitive evaluations of life. *Annu. Rev. Psychol.* 2003, *54*, 403–25.
111. Roscoe, L.J. Wellness: A review of theory and measurement for counsellors. *J. Couns. Dev.* 2009, *87*, 216–226.
112. Ares, G.; de Saldamando, L.; Giménez, A.; Claret, A.; Cunha, L.M.; Guerrero, L.; de Moura, A.P.; Oliveira, D.C.R.; Symoneaux, R.; Deliza, R. Consumers' associations with wellbeing in a food-related context: A cross-cultural study. *Food Qual. Prefer.* 2015, *40*, 304–315.
113. Meiselman, H.L. Quality of life, well-being and wellness: Measuring subjective health for foods and other products. *Food Qual. Prefer.* 2016, *54*, 101–109.
114. Diener, E.; Scollon, C.N.; Lucas, R.E. *Assessing Well-Being*; Springer Netherlands: Dordrecht, 2009;
115. Organization World Health *Global status report on noncommunicable diseases*; Geneva, Switzerland, 2014;
116. Ismael, D.; Angelika, P. Consumers' Emotion Attitudes towards Organic and Conventional Food: A Comparison Study of Emotional Profiling and Self-Reported Method. *Foods* 2020, *9*, 79.
117. Whitmarsh, L.; O'Neill, S. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J. Environ. Psychol.* 2010, *30*, 305–314.
118. William, Y.; Kumju, H.; Seonaidh, M.; Caroline, J.O. Sustainable consumption: green consumer behaviour when purchasing products. *Sustain. Dev.* 2010, *18*, 20–31.
119. Du, S.; Bartels, J.; Reinders, M.; Sen, S. Organic consumption behaviour: A social identification perspective. *Food Qual. Prefer.* 2017, *62*, 190–198.
120. Friese, M.; Basel, M.W.; Plessner, H. Implicit Consumer Preferences and Their Influence on Product Choice. *Psychol. Mark.* 2006, *23*, 727–740.
121. Magnusson, M.K.; Arvola, A.; Hursti, U.K.K.; Åberg, L.; Sjödén, P.O. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite* 2003, *40*, 109–117.
122. Massey, M.; O'Cass, A.; Otahal, P. A meta-analytic study of the factors driving the purchase of organic food. *Appetite* 2018, *125*, 418–427.
123. Moser, A.K. Consumers' purchasing decisions regarding environmentally-friendly products: An empirical analysis of German consumers. *J. Retail. Consum. Serv.* 2016, *31*, 389–397.
124. Rana, J.; Paul, J. Consumer behaviour and purchase intention for organic food: A review and research agenda. *J. Retail. Consum. Serv.* 2017, *38*, 157–165.
125. Bublitz, M.G.; Peracchio, L.A.; Andreasen, A.R.; Kees, J.; Kidwell, B.; Miller, E.G.; Motley, C.M.; Peter, P.C.; Rajagopal, P.; Scott, M.L.; et al. Promoting positive change: Advancing the food well-being paradigm. *J. Bus. Res.* 2013, *66*, 1211–1218.
126. Block, L.G.; Grier, S.A.; Childers, T.L.; Davis, B.; Ebert, J.E.J.J.; Kumanyika, S.; Laczniak, R.N.; Machin, J.E.; Motley, C.M.; Peracchio, L.; et al. From nutrients to nurturance: A conceptual introduction to food well-being. *J. Public Policy Mark.* 2011, *30*, 5–13.
127. Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. *New Measures of Well-Being*; E., D., Ed.; Springer: Dordrecht, 2009; Vol. 39; 247-266.
128. Grunert, K.G.; Dean, M.; Raats, M.M.; Nielsen, N.A.; Lumbers, M. A measure of satisfaction with food-related life. *Appetite* 2007, *49*, 486–493.

129. Guillemin, I. ; Marrel, A. ; Arnould, B. ; Capuron, L. ; Dupuy, A. ; Ginon, E. ; Layé, S. ; Lecerf, J.M. ; Prost, M. ; Rogeaux, M. ; et al. How French subjects describe well-being from food and eating habits? Development, item reduction and scoring definition of the Well-Being related to Food Questionnaire (Well-BFQ©). *Appetite* 2016, *96*, 333–346.
130. Ares, G.; De Saldamando, L.; Giménez, A.; Deliza, R. Food and wellbeing. Towards a consumer-based approach. *Appetite* 2014, *74*, 61–69.
131. Apaolaza, V.; Hartmann, P.; D'Souza, C.; López, C.M. Eat organic – Feel good? The relationship between organic food consumption, health concern and subjective wellbeing. *Food Qual. Prefer.* 2018, *63*, 51–62.
132. Diener, E. New findings and future directions for subjective well-being research. *Am. Psychol.* 2012, *67*, 590.
133. Haybron, D.M. *Philosophy and the science of subjective well-being*; 2008.
134. Geier, U.; Hermann, I.; Mittag, K.; Buchecker, K. First steps in the development of a psychological test on the effects of food on mental well-being. *J. Sci. Food Agric.* 2012, *92*, 2753–2756.
135. Geier, U.; Büssing, A.; Kruse, P.; Greiner, R.; Buchecker, K. Development and application of a test for food-induced emotions. *PLoS One* 2016, *11*, 1–17.
136. Cardello, A. V.; Meiselman, H.L.; Schutz, H.G.; Craig, C.; Given, Z.; Lesher, L.L.; Eicher, S. Measuring emotional responses to foods and food names using questionnaires. *Food Qual. Prefer.* 2012, *24*, 243–250.
137. Gutjar, S.; Dalenberg, J.R.; de Graaf, C.; de Wijk, R.A.; Palascha, A.; Renken, R.J.; Jager, G. What reported food-evoked emotions may add: A model to predict consumer food choice. *Food Qual. Prefer.* 2015, *45*, 140–148.
138. Ng, M.; Chaya, C.; Hort, J. Beyond liking: Comparing the measurement of emotional response using EsSense Profile and consumer defined check-all-that-apply methodologies. *Food Qual. Prefer.* 2013, *28*, 193–205.
139. Schouteten, J.J.; de Steur, H.; de Pelsmaeker, S.; Lagast, S.; de Bourdeaudhuij, I.; Gellynck, X. Impact of health labels on flavour perception and emotional profiling: A consumer study on cheese. *Nutrients* 2015, *7*, 10251–10268.
140. Spinelli, S.; Masi, C.; Dinnella, C.; Zoboli, G.P.; Monteleone, E. How does it make you feel? A new approach to measuring emotions in food product experience. *Food Qual. Prefer.* 2014, *37*, 109–122.
141. Dalenberg, J.R.; Gutjar, S.; Ter Horst, G.J.; De Graaf, K.; Renken, R.J.; Jager, G. Evoked emotions predict food choice. *PLoS One* 2014, *9*, 1–16.
142. Leitch, K.A.; Duncan, S.E.; O'Keefe, S.; Rudd, R.; Gallagher, D.L. Characterizing consumer emotional response to sweeteners using an emotion terminology questionnaire and facial expression analysis. *Food Res. Int.* 2015, *76*, 283–292.
143. Piqueras-Fiszman, B.; Jaeger, S.R. Emotion responses under evoked consumption contexts: A focus on the consumers' frequency of product consumption and the stability of responses. *Food Qual. Prefer.* 2014, *35*, 24–31.
144. Diane M. Phillips How Does It Make Me Feel? *J. Food Prod. Mark.* 2000, *6*, 15–33.
145. Newell, B.R.; Shanks, D.R. Unconscious influences on decision making. 2012, 1–72.
146. Dijksterhuis, A.; Spears, R.; Postmes, T.; Stapel, D.; Koomen, W.; Knippenberg, A. van; Scheepers, D. Seeing one thing and doing another: Contrast effects in automatic behaviour. *J. Pers. Soc. Psychol.* 1998, *75*, 862–871.
147. Dijksterhuis, A.; Nordgren, L.F. A Theory of Unconscious Thought. 2006, *1*, 95–109.
148. Dane, E.; Pratt, M.G. Exploring Intuition and Its Role in Managerial Decision Making. *Source Acad. Manag. Rev. Acad. Manag. Rev.* 2007, *32*, 33–54.

149. Lassiter, G.D.; Bellezza, F.; Phillips, N.; Harman, J.; Chimeli, J.; González Vallejo, C.; Lindberg, M.J.; Cheng, J. Early Positive Information Impacts Final Evaluations: No Deliberation-Without-Attention Effect and a Test of a Dynamic Judgment Model. *J. Behav. Decis. Mak.* 2013, *27*, 209–225.
150. Koola, P.M.; Benjamin, P.; Schatz, S.; Colombo, G. A Methodology for Capturing and Fusing Unconscious Cognition with Computation. *Procedia Manuf.* 2015, *3*, 4129–4135.
151. Truong, K.P.; Neerincx, M. a; Leeuwen, D. a Van Measuring emotions using eye tracking Jakob. In Proceedings of the International Conference on Methods and Techniques in Behavioural Research. The Netherlands, 2008; p. 226.
152. Kühn, S.; Brass, M. Retrospective construction of the judgement of free choice. *Conscious. Cogn.* 2009, *18*, 12–21.
153. Dürrschmid, K. Psychologie und lebensmittelsensorik. *J. fur Ernahrungsmedizin* 2008, *10*, 15–19.
154. Padel, S.; Foster, C. Exploring the gap between attitudes and behaviour Understanding why consumers buy or do not buy organic food. *Br. Food J.* 2005, *107*, 606–625.
155. Greenwald, A.G. What cognitive representations underlie social attitudes? *Bull. Psychon. Soc.* 1990, *28*, 254–260.
156. Greenwald, A.G.; Nosek, B.A. Attitudinal Dissociation: What Does it Mean? In *Attitudes: Insights from the New Implicit Measures*; Psychology Press., 2008; pp. 85–102.
157. Schwepker, C.H.; Cornwell, T.B. An Examination of Ecologically Concerned Consumers and Their Intention to Purchase Ecologically Packaged Products. *J. Public Policy Mark.* 1991, *10*, 77–101.
158. Moser, A.K. Thinking green, buying green? Drivers of pro-environmental purchasing behaviour. *J. Consum. Mark.* 2015, *32*, 167–175.
159. Dooris, M.; Farrier, A.; Froggett, L. Wellbeing: the challenge of 'operationalising' a holistic concept within a reductionist public health programme. *Perspect. Public Health* 2017, *138*, 93–99.
160. Srednicka-Tober, D.; Barański, M.; Seal, C.; Sanderson, R.; Benbrook, C.; Steinshamn, H.; Gromadzka-Ostrowska, J.; Rembiałkowska, E.; Skwarło-Sońta, K.; Eyre, M.; et al. Composition differences between organic and conventional meat: A systematic literature review and meta-analysis. *Br. J. Nutr.* 2016, *115*, 994–1011.
161. Simões-Wüst, A. P., Moltó-Puigmartí, C., Jansen, E. H., van Dongen, M. C., Dagnelie, P. C., & Thijs, C. Organic food consumption during pregnancy and its association with health-related characteristics: the KOALA Birth Cohort Study. *Public Health Nutr.* 2017, *20*, 2145-2156.
162. Jallinoja, P.; Niva, M.; Helakorpi, S.; Kahma, N. Food choices, perceptions of healthiness, and eating motives of self-identified followers of a low-carbohydrate diet. *Food Nutr. Res.* 2014, *58*, 23552.
163. Diener, E.; Wirtz, D.; Tov, W.; Kim-Prieto, C.; Choi, D. won; Oishi, S.; Biswas-Diener, R. New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Soc. Indic. Res.* 2010, *97*, 143–156.
164. Meiselman, H.L. A review of the current state of emotion research in product development. *Food Res. Int.* 2015, *76*, 192–199.
165. Delarue, J.; Lawlor, B.; Rogeaux, M. (Eds. *Rapid sensory profiling techniques: Applications in new product development and consumer research. Elsevier*, 2014.
166. Mauss, I.B.; Robinson, M.D. Measures of emotion: A review. *Cogn. Emot.* 2009, *23*, 209–237.
167. Collinsworth, L.A.; Lammert, A.M.; Martinez, K.P.; Leidheiser, M.; Garza, J.; Keener, M.; Ashman, H. Development of a novel sensory method: Image Measurement of Emotion and Texture (IMET). *Food Qual. Prefer.* 2014, *38*, 115–125.
168. Leeuw, E.D. de; Joop Hox, D.D. *International Handbook of Survey Methodology*; Routledge, 2008;

169. Piotrowski, C.; Armstrong, T. Colour Red: Implications for applied psychology and marketing research. *Psychol. Educ.* 2012, *49*, 55–57.
170. Mahnke, F.H. Colour, environment, and human response: an interdisciplinary understanding of colour and its use as a beneficial element in the design of the architectural environment. *John Wiley Sons* 1996.
171. Gmuer, A.; Nuessli Guth, J.; Runte, M.; Siegrist, M. From emotion to language: Application of a systematic, linguistic-based approach to design a food-associated emotion lexicon German. *Food Qual. Prefer.* 2015, *40*, 77–86.
172. Ares, G.; Jaeger, S.R. A comparison of five methodological variants of emoji questionnaires for measuring product elicited emotional associations: An application with seafood among Chinese consumers. *Food Res. Int.* 2017, *99*, 216–228.
173. Piqueras-Fiszman, B.; Jaeger, S.R. The effect of product–context appropriateness on emotion associations in evoked eating occasions. *Food Qual. Prefer.* 2015, *40*, 49–60.
174. Lang, P.J.; Greenwald, M.K.; Bradley, M.M.; Hamm, A.O. Looking at pictures: Affective, facial, visceral, and behavioural reactions. *Psychophysiology* 1993, *30*, 261–273.
175. Royet, J.P.; Zald, D.; Versace, R.; Costes, N.; Lavenne, F.; Koenig, O.; Gervais, R. Emotional responses to pleasant and unpleasant olfactory, visual, and auditory stimuli: a positron emission tomography study. *J. Neurosci.* 2000, *20*, 7752–9.
176. Olofsson, J.K.; Nordin, S.; Sequeira, H.; Polich, J. Affective picture processing: An integrative review of ERP findings. *Biol. Psychol.* 2008, *77*, 247–265.
177. Calvo, M.G.; Lang, P.J. Gaze patterns when looking at emotional pictures: Motivationally biased attention. *Motiv. Emot.* 2004, *28*, 221–243.
178. Foti, D.; Hajcak, G.; Dien, J. Differentiating neural responses to emotional pictures: Evidence from temporal-spatial PCA. *Psychophysiology* 2009, *46*, 521–530.
179. Xing, C.; Isaacowitz, D.M. Aiming at happiness: How motivation affects attention to and memory for emotional images. *Motiv. Emot.* 2006, *30*, 243–250.
180. Meyners, M.; Castura, J.C.; Carr, B.T. Existing and new approaches for the analysis of CATA data. *Food Qual. Prefer.* 2013, *30*, 309–319.
181. Acker, F. Conscious versus unconscious thought.pdf. *Judgm. Decis. Mak.* 2008, *3*, 292–303.
182. Thompson, E.R. Development and validation of an internationally reliable short-form of the Positive and Negative Affect Schedule (PANAS). *J. Cross. Cult. Psychol.* 2007, *38*, 227–242.
183. Millock, K.; Hansen, L.G. Willingness to Pay for Organic Foods: A Comparison between Survey Data and Panel Data from Denmark. In Proceedings of the paper presented at EAERE (European Association of Environmental and Resource Economists), Munich Personal RePEc Archive, Munchin, Germany. 2002.
184. Aertsens, J.; Verbeke, W.; Mondelaers, K.; Van Huylenbroeck, G. Personal determinants of organic food consumption: a review. *Br. Food J.* 2009, *111*, 1140–1167.
185. Hashmi, U.; Huong, N.T.; Wee, C.S. Key Factors Affecting Consumer Purchase Intention a Study of Safe Vegetable in Ho Chi Minh City, Vietnam. *Univ. Econ. Ho Chi Minh City Int. Sch. Bus.* 2012, *1*, 1–68.
186. Hamm, U.; Hemmerling, S.; Schleenbecker, R.; Spiller, A.; Wägeli, S.; Cordts, A.; Hermann, I.; Sonntag, I.; Kary, V. *Consumer purchase and consumption behaviour regarding organic food – Analysis of the state of the art. Final Report*; 2012.
187. Thøgersen, J.; de Barcellos, M.D.; Perin, M.G.; Zhou, Y. Consumer buying motives and attitudes towards organic food in two emerging markets: China and Brazil. *Int. Mark. Rev.* 2015, *32*, 389–413.
188. Thomson, D.M.H.; Crocker, C.; Marketo, C.G. Linking sensory characteristics to emotions: An example using dark chocolate. *Food Qual. Prefer.* 2010, *21*, 1117–1125.

189. Mojet, J.; Dürrschmid, K.; Danner, L.; Jöchl, M.; Heiniö, R.L.; Holthuysen, N.; Köster, E. Are implicit emotion measurements evoked by food unrelated to liking? *Food Res. Int.* 2015, *76*, 224–232.
190. Desmet, P.M.A.; Schifferstein, H.N.J. Sources of positive and negative emotions in food experience. *Appetite* 2008, *50*, 290–301.
191. Wang, J.; Bao, J.; Wang, C.; Wu, L. The impact of different emotional appeals on the purchase intention for green products: The moderating effects of green involvement and Confucian cultures. *Sustain. Cities Soc.* 2017, *34*, 32–42.
192. Verhoef, P.C. Explaining purchases of organic meat by Dutch consumers. *Eur. Rev. Agric. Econ.* 2005, *32*, 245–267.
193. Dean, M.; Raats, M.M.; Shepherd, R. Moral concerns and consumer choice of fresh and processed organic foods. *J. Appl. Soc. Psychol.* 2008, *38*, 2088–2107.
194. De Houwer, J., & Moors, A. How to define and examine implicit processes? In *Psychology of science: Implicit and explicit processes*; R. Proctor & E. J. Capaldi (Eds.), Ed.; Oxford: Oxford University Press, 2012; pp. 183–198.
195. Ismael, D.; Ploeger, A. Development of a Sensory Method to Detect Food-Elicited Emotions Using Emotion-Colour Association and Eye-Tracking. *Foods* 2019, *8*, 217.
196. Beattie, G.; McGuire, L.; Sale, L. Do we actually look at the carbon footprint of a product in the initial few seconds? An experimental analysis of unconscious eye movements. *Int. J. Environ. Cult. Econ. Soc. Sustain.* 2010, *6*, 47–66.
197. Gottschalk, I.; Leistner, T. Consumer reactions to the availability of organic food in discount supermarkets. 2013, *37*, 136–142.
198. Bourn, D.; Prescott, J. A comparison of the nutritional value, sensory qualities, and food safety of organically and conventionally produced foods. *Crit. Rev. Food Sci. Nutr.* 2002, *42*, 1–34.
199. Ellison, B.; Duff, B.R.L.; Wang, Z.; White, T.B. Putting the organic label in context: Examining the interactions between the organic label, product type, and retail outlet. *Food Qual. Prefer.* 2016, *49*, 140–150.
200. Montaño, Z., Smith, J. D., Dishion, T. J., Shaw, D. S., & Wilson, M.N. Longitudinal Relations Between Observed Parenting Behaviours and Dietary Quality of Meals from Ages 2 to 5. *Appetite* 2015, *87*, 1324–329.
201. Schouteten, J.J.; De Steur, H.; Sas, B.; De Bourdeaudhuij, I.; Gellynck, X. The effect of the research setting on the emotional and sensory profiling under blind, expected, and informed conditions: A study on premium and private label yoghurt products. *J. Dairy Sci.* 2017, *100*, 169–186.
202. Weber, J.L. Analyzing the Correlation Between Overall Likeness and Emotional Responses Before and After the Consumption of Dairy Beverages. 2012, 1–24.
203. Friese, M.; Basel, M.W.; Plessner, H. Implicit Consumer Preferences and Their Influence on Product Choice. *Psychol. Mark.* 2006, *23*, 727–740.
204. Cochran, W.G. *Sampling Techniques*; 2nd ed.; New York: John Wiley and Sons, Inc., 1963.
205. Saito, M. A comparative study of colour preferences in Japan, China and Indonesia, with emphasis on the preference for white. Percept. Mot. Skills 1996, 83, 115–128.
206. Saito, M. A cross-cultural study on colour preference in three Asian cities. Jpn. Psychol. Res. 1994, 36, 219–232.
207. Adams, F.M.; Osgood, C.E. A Cross-Cultural Study of the Affective Meanings of Colour. *J. Cross. Cult. Psychol.* 1973, *4*, 135–156.
208. Siedlecki, K.L.; Salthouse, T.A.; Oishi, S.; Jeswani, S. The Relationship Between Social Support and Subjective

Well-Being Across Age. Soc. Indic. Res. 2014, 117, 561–576

209. Zhang, W., Gowdy, J., Bassi, A.M., Santamaria, M., DeClerck, F., Adegboyega, A., Andersson, G.K.S.; Augustyn, A.M., Bawden, R., Bell, A., Darknhofer, I., Dearing, J., Dyke, J., Failler, P., Galetto, L., Hernández, C.C., Johnson; P., Jones, S.K., Kleppel, G., Komarek, A.M., Latawiec, A., Mateus, R., McVittie, A., Ortega, E., Phelps, D., Ringler, C., Sangha; K.K., Schaafsma, M., Scherr, S., Hossain, M.S., Thorn, J.P.R., Tyack, N., Vaessen, T., Viglizzo, E., Walker, D., Willemen, L. and; Wood, S.L.R. Systems thinking: an approach for understanding 'eco-agri-food systems'; 2018; ISBN 9789280737028
210. European Commission Farm to Fork Strategy For a fair, healthy and environmentally-friendly food system; 2020. Retrieved from: https://ec.europa.eu/food/farm2fork_en (accessed on 27/07/2020).
211. OECD How's Life? Measuring well-being, OECD Publishing, 2019. Retrieved from: http://www.oecd.org/statistics/how-s-life-23089679.htm (accessed on 27.07.2020)
212. Mcgillivray, M.; Clarke, M. Human well-being : Concepts and measures. United Nations Univ. Press. New York, NY., 2006, pp.3-16.
213. Tsurumi, T.; Managi, S. Monetary Valuations of Life Conditions in a Consistent Framework: The Life Satisfaction Approach. J. Happiness Stud. 2017, 18, 1275–1303.
214. Diener, E.; Emmons, R.A.; Larsen, R.J. The Satisfaction With Life Scale. J. Pers. Assess. 1985, 49, 71–75.'
215. Diener, E.; Suh, E.M.; Lucas, R.E.; Smith, H.L. Subjective Weil-Being: Three Decades of Progress. Am. Psychol. Assoc. 1999, 125, 276–302.
216. Escadas, M.; Jalali, M.S.; Farhangmehr, M. What goes around comes around: The integrated role of emotions on consumer ethical decision-making. J. Consum. Behav. 2020, 1–14.

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Chapter 2: Development of a Sensory Method to Detect Food-Elicited Emotions Using Emotion-Colour Association and Eye-Tracking

Diana Ismael * and Angelika Ploeger

Specialized Partnerships in Sustainable Food Systems and Food Sovereignty, University of Kassel, 34125 Kassel, Germany; a.ploeger@uni-kassel.de

* Correspondence: diana.ismael@uni-kassel.de, Tel: +49 561 804-1717

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Abstract: Studying consumers' implicit emotions has been always described as a difficult and complicated mission due to the emotions being of a non-cognitive nature. This research aims to develop a new method based on Emotion-Colour Association (ECA) to detect consumer's implicit food-elicited emotions using an eye-tracker tool. The study was accomplished in two experiments. The first experiment intended to build a new colour scale based on the emotion-colour association using the eye-tracking method and a self-reported questionnaire (SRQ). The results showed that people tend to express their evoked positive emotions by choosing mostly light colours, and favour to choose dark colours to reveal their evoked negative emotions. In the second experiment, a sensory evaluation was conducted employing the developed colour scale in addition to the verbal emotion-based questionnaire (VEQ) to detect the participants' food-elicited emotions with different samples. The sensory evaluation consisted of taste, smell, and vision tests. The study demonstrated consistency between the results of the verbal emotion questionnaire and the new colour scale method. This consistency may refer to the capability of the developed scale, as a non-intrusive method that obtains prompt responses and avoids deliberate action, to rapidly detect the implicit emotions in a sensory evaluation for a better understanding of the consumer's behaviour.

Keywords: the colour scale; emotion-colour association (ECA); colour-emotion association; eye-tracking; light colours; dark colours; general positive emotions (GPE); general negative emotions (GNE); sensory evaluation; self-reported questionnaire (SRQ), verbal emotion-based questionnaire (VEQ).

1. Introduction

Emotions play a leading role in our food consumption behaviour, which, in turn, affects our mood and generates food-elicited emotions. People spontaneously express their food-elicited emotions within their daily life activities [1–6]. Studying and measuring those emotions has received greater attention by sensory and consumer researchers [1–6] and various approaches have been developed to measure and understand these emotions [3]. Laros and Steenkamp [4] suggest a hierarchical approach for a better understanding of consumer emotions. The hierarchical model consists of three levels, which includes the superordinate level that is based on general positive emotion and general negative emotion, the basic level of emotions (anger, fear, sadness, shame, contentment, happiness, love, and pride), and the subordinate level that includes 41 emotion terms.

However, emotions are known for their non-cognitive characteristic, which makes them a difficult subject to measure [5]. According to Winkielman and Berridge [6], an unconscious emotion is considered impossible to report the moment it was evoked even though people's behaviour can reflect this emotion. Some of the emotion-measurement methods that provide conscious deliberate answers were criticized with being inefficient at detecting the real implicit emotions and the

possibility of being affected by the Social Desirability Effect [7–11]. Thus, the need to develop new methods that are capable of measuring more implicit emotions has arisen.

Eye-tracking, which is a powerful technology that gives accurate data about the individual's eye movement and fixation on a specific target, is considered to be a reliable method to capture the non-cognitive reaction [12,13]. Therefore, it obtains prompt responses without the need to write or talk.

Moreover, colours carry intrinsic meanings and have a psychological relationship with emotions. Researchers suggest an innate functional relationship between colours and emotions [14]. The relationship between colours and emotions has two dimensions. The first one is the effect of colours on emotions, which is generally called colour-emotion association. Several studies reported that light colours (white, pink, yellow, blue, purple, and green) evoke positive emotions like happiness, excitement, joy, and hope [15–24]. Other studies reported associations between dark colours (black, brown, and grey) and negative emotions (sadness, anxiety, fear, and boredom) [20,23,25–27]. The second dimension is how to express emotions using colours, which is called the emotion-colour association (ECA). Two studies indicated that participants tend to express their emotional reactions using light and dark colours [28,29]. In those studies, participants used light colour crayons such as yellow, orange, and green to colour their drawing after watching happy scenes or hearing happy stories. While they used dark colour crayons such as brown and black after listening to sad stories or watching sad scenes. Therefore, implicit positive and negative emotions can be expressed by new methods employing colours.

None of the currently used methods to study emotions has combined the eye-tracking technology with the emotion-colour association concept to comprehend the implicit emotions on a superordinate level in sensory evaluations. This study aims to take advantage of the relationship between colours and emotions, using the ECA combined with the eye-tracking tool, to develop a new non-intrusive method in order to have a deeper insight on the implicit food-elicited emotions in a sensory test.

2. Materials and Methods

This study was conducted as a between-subject design in two experiments with a three-month interval and a total of 557 participants. As shown in Figure 1, the first experiment consisted of a self-reported questionnaire (SRQ) and a stationary eye-tracking experiment. The second experiment was a sensory evaluation that combined the eye-tracking method with a verbal emotion-based questionnaire (VEQ). Each experimental session was carried out individually. All the participants volunteered to take part in the current study, and each participant booked a date and time for an individual session via an online scheduling tool. Table 1 demonstrates the number, age, and gender of the participants in each experiment.

Table 1. Number, gender percentage, and age of the participants in the experiments.

Experiment		Gender (%)		Age (Years)	Number of Participants
Developing the colour scale	Self-reported questionnaire	Male	21%	18–88	487
		Female	79%		
	Eye-tracking	Male	37%	18–30	30
		Female	63%		
Sensory evaluation		Male	35%	19–48	40
		Female	65%		

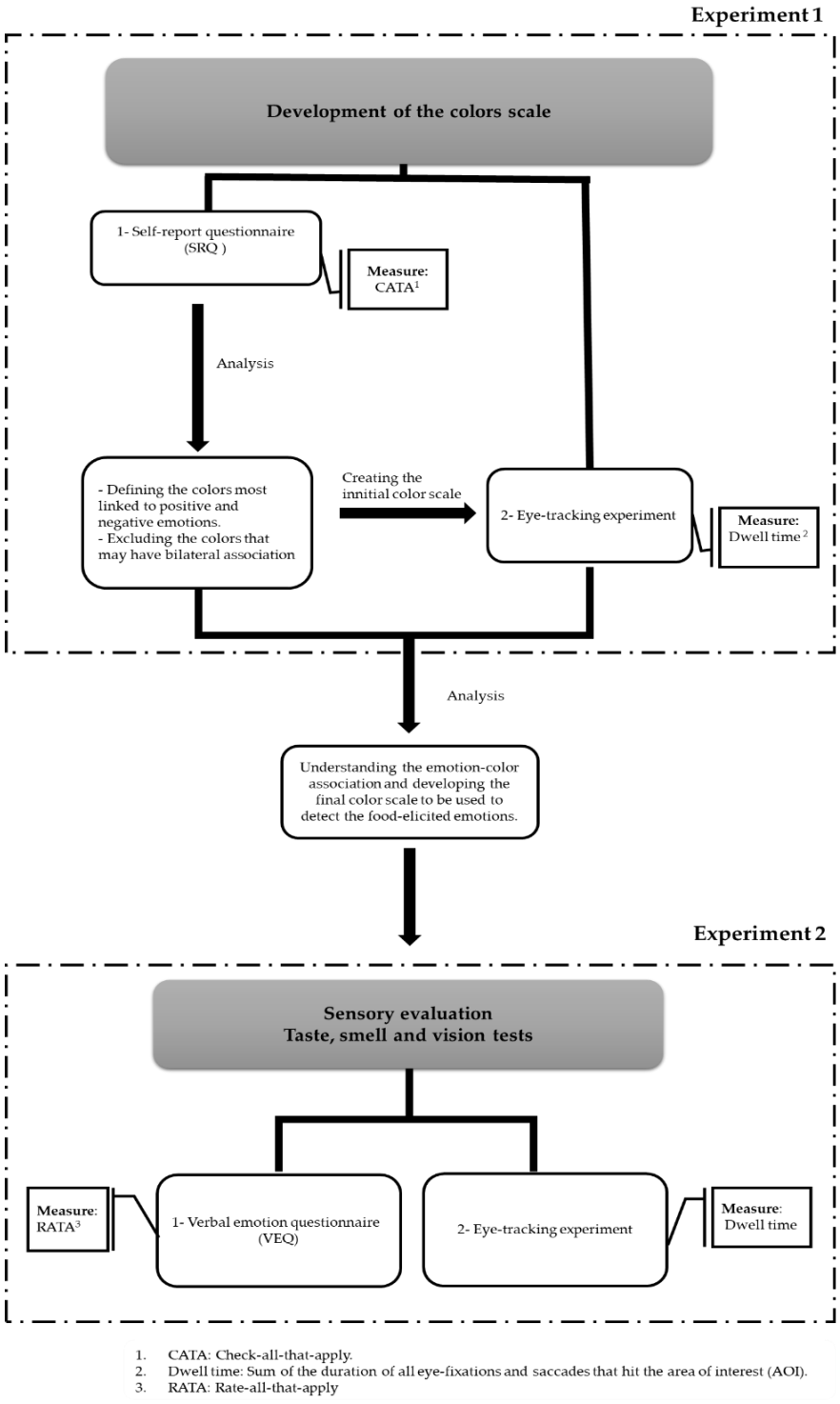


Figure 1. The above flowchart demonstrates the experimental design.

2.1. First Experiment: Developing the Colour Scale Based on the Emotion-Colour Association

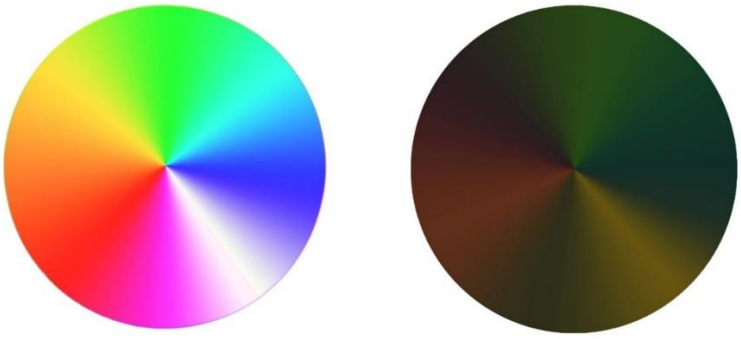
To study the emotion-colour association, the current research used two types of measures. The first measure was a self-reported questionnaire that aimed to better understand the relationship between colours and emotions in order to develop the colour scale. The second measure employed the developed colour scale together with the eye-tracking tool to investigate the implicit emotion-colour association.

2.1.1. Self-Reported Questionnaire

A web-based questionnaire was designed using the online tool Typeform® and was carried out with 487 participants. The questionnaire consisted of two main parts. The first part of the questionnaire intended to investigate the colour-emotion association and understand the perceived emotional reaction toward two sets of light and dark colours. The second part aimed to study the emotion-colour association by detecting how participants may use light and dark colour samples to express their evoked emotions. All the questions were of a check-all-that-apply (CATA) type.

2.1.2. Procedures

In the first part of SRQ, two colour wheels (Figure 2 a and b), designed by the authors using Adobe Photoshop PS, were used to investigate the effects of light and dark colours on participants' emotions.



(a) (b)

Figure 2. The colour wheels used in the self-reported questionnaire (SRQ). (a) The wheel of the light colours, and (b) the wheel of the dark colours. Source: researcher's design.

The participants were first shown the light colour wheel (LCW). Then they were asked to choose the term(s) that reflect their emotions toward the displayed colour wheel. The question included a set of 22 positive and negative emotion-based terms (happy, hopeful, encouraged, motivated, peaceful, fulfilled, thrilled, enthusiastic, romantic, pleased, pride, angry, sad, frustrated, irritated, discontented, envious, scared, nervous, worried, guilty, and embarrassed) in addition to one neutral term "no emotion." The emotion-based terms were chosen based on the subordinate level of the hierarchical model of consumers' emotions [4]. A German translation based on the Food-Association Emotion lexicon was provided [30]. The same question was repeated using the dark colour wheel (DCW) with the same set of emotion-based terms.

The second part of the questionnaire investigated how participants may express their positive or negative emotions with light and dark colour samples. A guided imagination technique was used to evoke the participants' emotions [31–33]. The participants were first brought to imagine themselves consuming a specific food that evokes positive/negative emotion(s) (e.g. Take your time to imagine yourself eating food that evokes negative feelings within you, such as irritated, guilty, or nervous). The two questions, which evoke the positive/negative emotions, were separated with a neutral question. The participants were asked to use one or more of the colour samples (Figure 3) to express their evoked emotion(s). Then, participants were asked to choose the feature of the food that evoked the positive/negative emotion(s). The main provided features were: healthy, environmentally friendly, and tasty with items such as "The food which evoked positive feelings was healthy/ environmentally friendly, and tasty'' and "The food which evoked negative feelings was tasty but neither healthy nor environmentally friendly.''

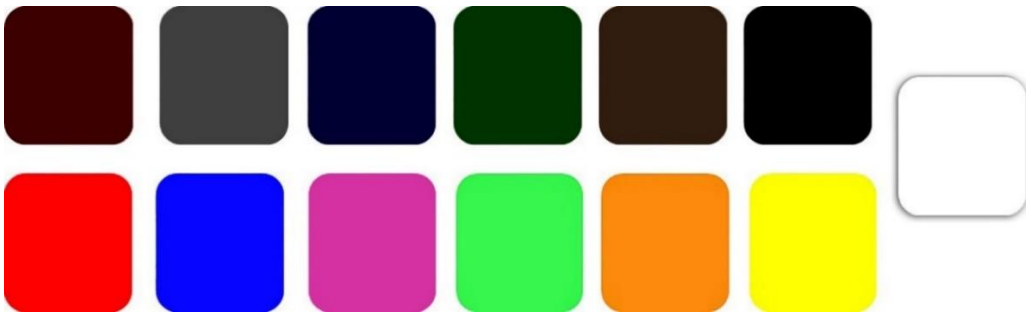


Figure 3. The displayed colour samples that participants were asked to choose from in order to express their emotions after imagining a food consumption experience. Source: researcher's design.

2.1.3. Eye-Tracking Experiment

The eye-tracking experiment took place at the sensory lab at Kassel University, Germany and aimed at studying the implicit ECA. Emotional stimuli (pictures combined with emotional music) were displayed to provoke participants' positive emotions (e.g. happiness, enthusiasm, and pleasant) or negative emotions (e.g. sadness, anger, and fear). The data were then recorded by using an individual laptop equipped with a specialized eye-tracker (SMI RED-250 mobile) manufactured by SensoMotoric Instruments (SMI, Germany). SMI RED-250 mobile is a fully portable, screen-based eye-tracker powered by USB and has a sampling rate of 60 Hz. All participants were confirmed to have a normal or corrected vision.

2.1.4. Procedures

A pre-test was performed to choose the most emotionally affective pictures for the trial. The pictures were rated on a 5-point scale (1= very negative, 5= very positive). Based on the pre-test, 20 emotional pictures (Appendix A) were chosen to be included, together with emotional music, in the stimuli. Ten of the emotional stimuli were positive and 10 were negative. Half of the 20 pictures were chosen randomly as chromatic and the other half as achromatic to study the effect of the pictures' colour on the participants' choice between the dark and the light colours in the colour scale.

Verbal and written explanation about the experiment and the content of the stimuli was provided. The participants were seated 50 cm in front of the laptop with the eye-tracker, and a simulation including detailed instruction was performed to accommodate the participants to the task.

The 20 stimuli were clustered into four groups. Two groups consisted of five positive emotional stimuli, and the other two consisted of five negative stimuli. The groups were displayed alternately based on the general emotions to avoid the bias that may result from the sequential display of positive/negative stimuli. After each group of stimuli, a neutral stimulus with no music was displayed for 10 s. Each emotional stimulus was displayed on the screen for 6 s [34]. A pre-examination showed that 6 s among other applied periods (10 s, 15 s, and 20 s) was the best period to leave the participants enough time to experience the evoked emotions without boring them with excessive time watching the stimulus. Since previous neuroscience and behavioural measures studies report that the response to an emotional stimulus happens in a matter of milliseconds (>1000 ms) [35,36], a panel of gradate colours, the colour scale, were displayed for 3 s [37] after each stimulus. The colour scale was designed using Adobe Photoshop PS and consisted of light and dark sets of colours (Figure 4). This method forces a time-pressure condition on participants and results in reducing the influence of conscious thinking. The participants were instructed to focus on the screen and fix their sight on the set of colours that express their emotion(s) at that moment. The position of dark and light sets of colours was randomly alternated in the colour scale to avoid the bias resulting from keeping the colour sets in the same position. A white fixation cross was presented on the center of each emotional photo in the last 500 ms prior to the offset of the stimulus [38] to correct the

participants fixation tendencies and minimize the fixation bias that may be caused by the last eye-fixation position before displaying the colour scale [39].

Figure 4. The colour scale, including light colour set and dark colour set, that was displayed for 3 s after each emotional stimulus. Source: researcher's design.

2.1.5. Data Analysis

The data of the SRQ were analyzed following the standard procedures for CATA questions [40]. The non-qualified and incomplete answers were excluded. The frequency of use for each emotion term was determined by counting the number of participants that chose that term to describe their emotions toward each colour wheel. Fisher's exact test was carried out to identify significant differences between genders in each of the terms included on the CATA questions. Wilcoxon Signed-Rank Test was used to detect the significant differences between the general positive emotions (GPE) and the general negative emotions (GNE) for each colour wheel.

The eye-tracking data were collected using the Key Performance Indicator (KPI) in the BeGaze program. The colour scale was divided into two Areas of Interest (AOI), and each set of colours was considered as an independent AOI. Dwell time value in milliseconds (ms), which represents the sum of the duration from all eye-fixations and saccades that hit the AOI, was collected. Figure 5 demonstrates the AOIs and the executive summary of the outcome data.

A paired t-test was conducted to detect any significant differences between dwell time on the AOIs after the positive and negative stimuli. Moreover, an analysis of variance was applied to investigate any differences between genders, stimuli colours, and the position of the dark and light side.

All significance tests were done at a significance level of 5%. The Statistical Package for Social Sciences (IBM, SPSS Statistics, version 24) was used to analyze all collected data.

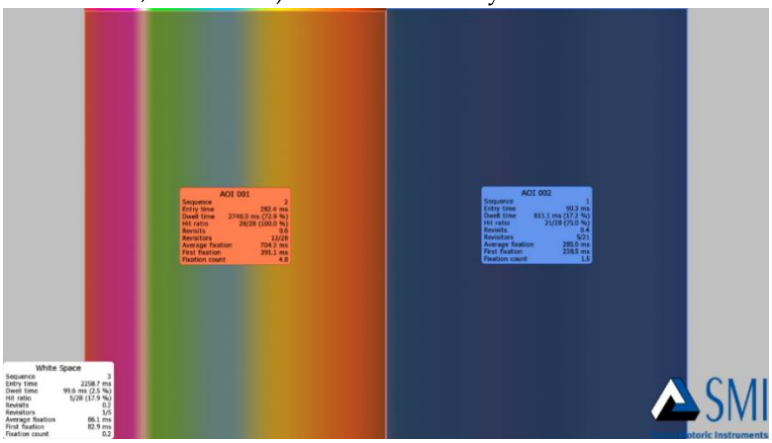


Figure 5. Key Performance Indication (executive summary). The AOI of the colour scale after a positive emotional stimulus.

2.2. Second Experiment: Sensory Evaluation

The aim of the sensory evaluation was to examine the participants' food-elicited emotions using the developed colour scale and a verbal emotion-based questionnaire (VEQ). The sensory test took place in standard sensory booths at the sensory labs of Kassel University and Fulda University of Applied Sciences under artificial daylight type illumination, and temperature control (22–24 °C) with air circulation, according to ISO standards (ISO 8589:2007). The experiment consisted of taste, smell, and visual tests, respectively. All participants confirmed to have normal or corrected vision and no eating disorders or allergies for any of the samples.

2.2.1. Samples

Eight samples were served in a sequential monadic testing. The samples were chosen to be acceptable by most people and easily available to consumers in supermarkets. The nature of the samples was declared in the announcement of the experiment to avoid allergy reaction to any of the samples. In the taste test, fresh apple (royal gala), ready-to-consume orange juice, and walnuts were served. Water was used for rinsing between samples. Oregano herbs, ground coffee, and fresh, red bell peppers were served in closed, odorless, plastic containers during the smell test, while the visual test consisted of a pear and a bottle of orange juice.

2.2.2. Procedures

The participants were placed in the position that suits best the functionality of the eye-tracker. Then, they went under a simulation test to get familiar with the instructions and the new colour scale. During taste, smell, and visual tests, the participants were asked to test the sample for around 20 s [41]. To guarantee the best period for the sample testing, the experimenter pretested different periods (15 s, 20 s, 40 s, and 60 s). The pre-test results verified the adequacy of the given 20 s time to test the samples and have an impression without getting bored. During the testing, a white screen was displayed on the monitor. Then a colour scale appeared on a full screen for 5 s [12,42]. Participants were instructed clearly to look at the screen and use only their eyes to focus on the colour set that expresses their food-elicited emotion(s). The participants who neither looked at the screen nor used the colour scale had their data excluded.

The position of the colour scale was reversed randomly to avoid the bias responses' result from displaying the same set of colours in the same position. To correct the participant's fixation tendencies and minimize the fixation bias that may be caused by the last eye-fixation position, a white fixation-cross was presented on the center of the white screen [38] the last 2 s prior to displaying the colour scale [39].

Subsequently, participants were asked to test the sample again, if desired, and rate their food-elicited emotion(s) using a verbal emotion-based questionnaire (VEQ) on a 5-point scale (1= I do not feel it at all, 5= I strongly feel it). Twelve emotion items were selected for the VEQ: happy, optimistic, proud, satisfied, encouraged, active, sad, regret, guilty, ashamed, scared, and angry. The terms were adopted from the Geneva Emotion Wheel (GEW), the Consumption Emotion Set (CES) [43], and the short-form of the Positive and Negative Affect Schedule (PANAS) [44]. All the questions were rate-all-that-apply (RATA) type.

The procedures were initially pretested with five participants (not included in the final data) to guarantee the best design of the experiment including the participant's seating position and given time to test the sample. The experimenter intended to start the session with a friendly conversation to relax the participants and avoid any kind of emotional upset or heavy pressure that prevents them from concentrating.

2.2.3. Data Analysis

For analytical purposes, the first six listed emotions in VEQ were considered positive emotions and the last six were considered as negative. The positive and the negative emotion terms were

considered as Likert scale questions and the mean values of the items loading on the VEQ were computed for each participant and labeled as "general positive emotions (GPE)" and "general negative emotions (GNE)''. Then parametric analysis was conducted to detect statistical differences.

Each set of colours was considered as an independent area of interest (AOI) and dwell time of each AOI was analyzed.

Analysis of variance was applied to analyze the differences between gender with regard to general emotions and dwell time.

A paired t-test and a Wilcoxon signed-rank test were conducted to analyze the differences between GPE and GNE, and dwell time on the light colours versus the dwell time on the dark colours after testing each sample.

3. Results

3.1. Self-Reported Questionnaire

In the first part of the SRQ, the participants were asked to choose the emotion-based terms they associate with two displayed colour wheels (light colour wheel and dark colour wheel). The results showed a significant difference between GPE and GNE for each of the two wheels ($p < 0.05$). The LCW evoked more positive emotions, while more negative emotions were associated with DCW.

As shown in Figure 6, 82.6% of the total answers were positive emotion terms (happy, hopeful, encouraged, motivated, peaceful, fulfilled, and other), 13.8% of the answers were negative emotion terms (angry, sad, frustrated, irritated, discontented, envious, scared, and others) and 3.6% of the participants had no emotions towards LCW. When the participants were asked about DCW, 80.6% of the total answers were negative emotion terms, 12% of the answers were positive terms, and 7.4% had no emotions toward the colours.

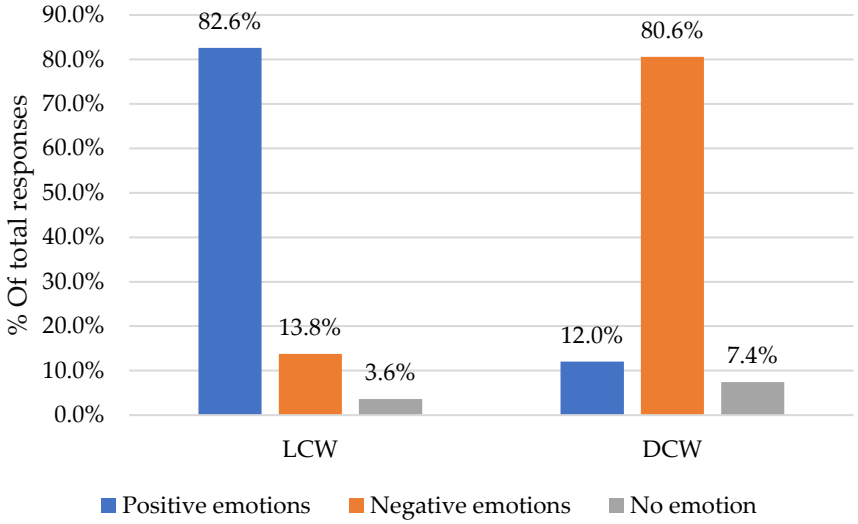


Figure 6. Percentages of total responses of positive, negative, and no emotion choices towards LCW and DCW. n= 487.

Pleased, happy, and hopeful were the most commonly selected emotion-based terms when the participants were asked about their emotions toward LCW. Discontented, sad, and worried were the most selected terms when participants were asked about their emotions toward DCW (Figure 7). Results showed a gender impact with the terms "angry" (p = 0.007, 1.8% females and 6.8% males), "scared" (p = 0.014, 20% females and 31% males) and "frustrated'' (p = 0.03, 21% females and 12% males) toward DCW. Gender had no impact on the effect of LCW on emotions ($ps > 0.05$).

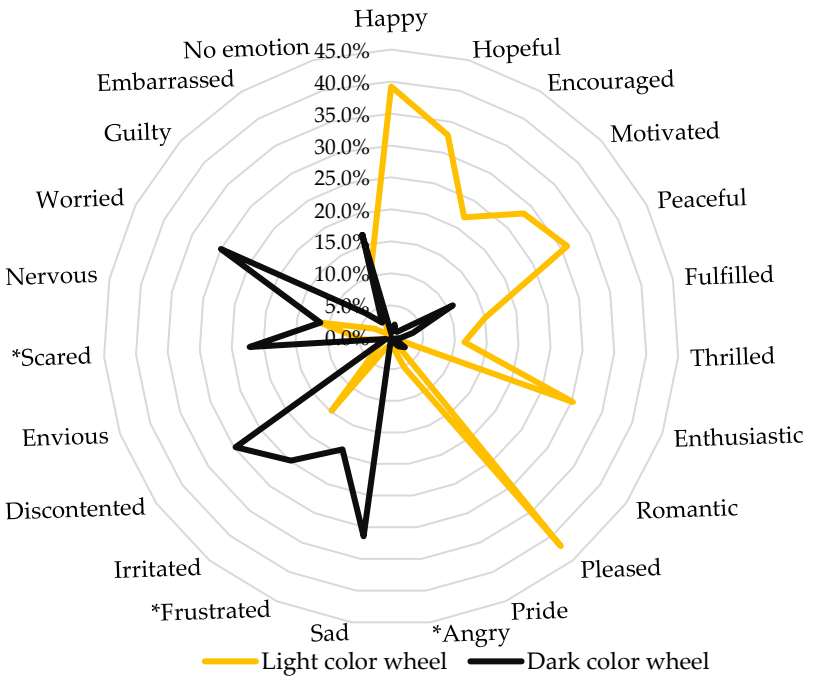


Figure 7. Percentage frequency of an emotional reaction given to each colour wheel. Asterisks indicate significance results. $n = 487$.

The second part of SRQ aimed to investigate how the participants would use the colours to express their evoked emotion(s) by imagining a food experience consumption. The frequency of use of orange, yellow, and green to express the evoked positive emotion(s) were the highest (53%, 37%, and 36%, respectively). On the other hand, 42%, 38%, and 34% of the participants chose grey, brown, and black, respectively, to express their negative evoked emotion(s). Red was one of the first five colours used to express both positive and negative emotion(s) (26.5% and 20.5%, respectively). The results showed that the gender had an impact only with regard to the white sample ($p < 0.05$) in which females chose ''white'' more than males to express their positive emotion(s).

Figure 8a and Figure 8b illustrates in order, the most and the least chosen colours to express positive and negative emotion(s).

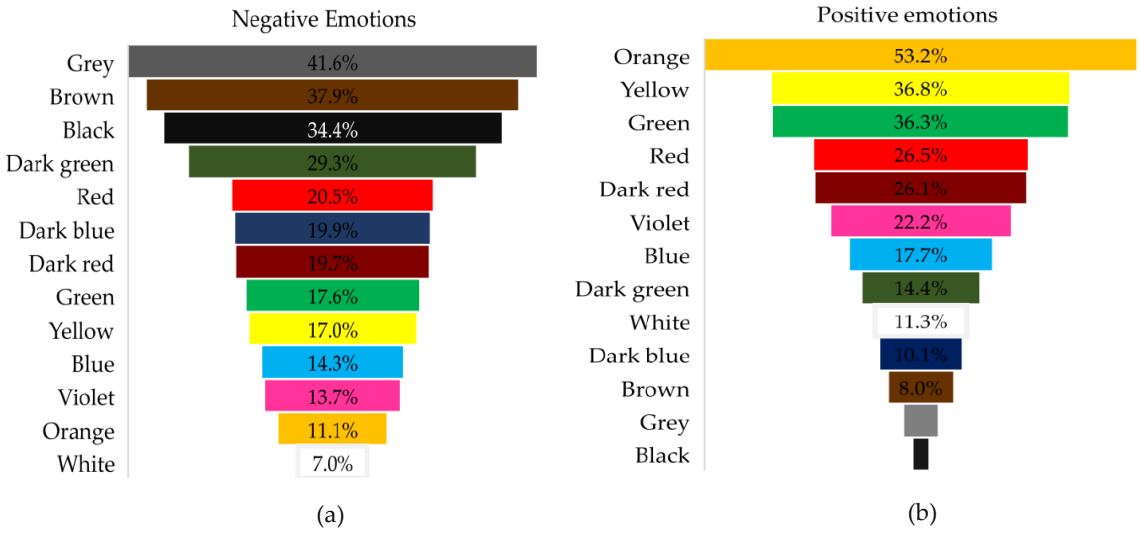


Figure 8. Percentage frequency of colour choices to express the evoked emotion(s). (a) The colour choices to express negative emotions. (b) The colour choice to express positive emotions.

Orange was the colour chosen with the greatest frequency to express positive emotion(s), while black was the least. On the contrary, grey was chosen with the greatest frequency after evoking negative emotion(s), while white was the least.

3.1.1. The Characteristics of the Food in the Imagined Consumption Experience

After the participants were asked to imagine eating a specific food that provokes positive/negative emotions, they were instructed to describe that food by choosing one or more of three aspects: health, environmental impact, and taste. "Healthy, environmentally-friendly, and tasty" was the first feature chosen by three-quarters of the participants to describe the food that evoked their positive emotion(s). In addition, 45% of the participants chose "only tasty", whereas 5% chose "healthy but not tasty" and only 2% of the participants declared that "environmentally-friendly but not tasty" food makes them have a positive emotion(s).

Furthermore, 51% of the participants declared that, if the food is "neither healthy nor environmentally-friendly, yet tasty", the food provokes a negative emotion(s). A very close percentage of participants (48%) showed that if the food is "healthy but not tasty", it provokes negative emotion(s). In addition, 40% of the participants reported that if the food is "environmentally-friendly but not tasty", it provokes a negative emotion(s). Table 2 demonstrates the frequency of participants' choices to describe the food in each situation.

Table 2. The characteristics of the food that evoked positive or negative emotions in the imagined consumption experience.

Food that Evoked	The Features of the Food	Frequency
Positive emotions	Healthy/ environmentally-friendly, and tasty	75.0%
	Tasty, even though it was neither healthy nor environmentally-friendly	45.4%
	Healthy, even though it was not tasty	5.0%
	Environmentally-friendly, even though it was not tasty	2.1%
Negative emotions	Tasty, but it was neither healthy nor environmentally-friendly	51.4%
	Healthy, but it was not tasty	48.3%
	Environmentally-friendly, but it was not tasty	40.1%

3.2. Eye-Tracking Experiment

The results showed a statistically significant difference between dwell time on the light colour set (LCS) and dwell time on the dark colour set (DCS) after displaying positive and negative emotional stimuli ($p < 0.05$). After the positive emotional stimuli, participants fixed their sight longer on the light colours (mean value of dwell time = 2112.8 ms), which represents 70% of the given time, to express their positive emotions, while the mean value of the dwell time on the DCS was 525.9 ms, which represents 18% of the given time. On the other hand, after the negative emotional stimuli, participants expressed their negative emotions by focusing on DCS. The mean value of dwell time on DCS was 1669.8 ms (56% of the given time), while it was 906 ms (30% of the given time) on LCS.

The results showed significant differences between genders in dwell time on both LCS and DCS after positive stimuli ($p < 0.05$). Females fixed their sight longer (2556 ms) on the light colours and less (403 ms) on the dark colours than males did (1996 ms, 640 ms on LCS and DCS, respectively) after the positive stimuli. After negative stimuli, a significant difference was found between genders only with dwell time on DCS ($p < 0.05$) where the average dwell time of females' eye-fixations (1982ms) was higher than males' (1591ms).

To investigate the influence of the stimulus' colours, some of the stimuli were chromatic and others were achromatic. The analysis showed no influence of the stimulus' colour on participants' eye-fixations between LCS and DCS ($p > 0.05$).

Similarly, the positioning of LCS with respect to the DCS had no significant impact on the participants' choice ($p > 0.05$). Thus, whether the colour scale was graduated (light/dark) from right to left or from left to right, neither had an impact on the participants' eye-fixations.

Furthermore, heat maps were generated by the BeGaze software to have a general insight on the gaze patterns of participants' eye-fixations. The Heat Map shows how much attention was received at a specific AOI, displayed as coloured foci. Figures 9 and 10 show examples of the generated heat maps (focus map) after viewing a negative stimulus and a positive one, respectively. Figure 9 demonstrates higher focused eye-gaze patterns on DCS within 3 s after being shown a negative emotional stimulus. Figure 10 demonstrates the eye-gaze pattern after a positive stimulus.

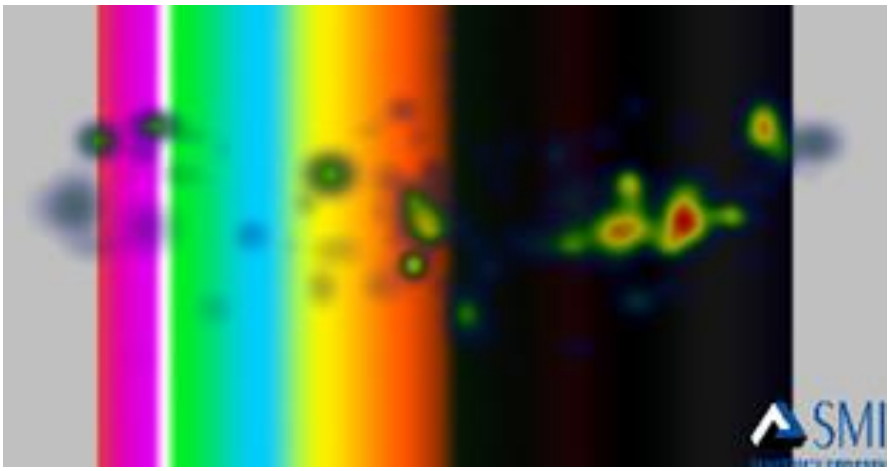


Figure 9. The heat map that demonstrates the eye-gaze patterns over the AOIs after displaying a negative stimulus.

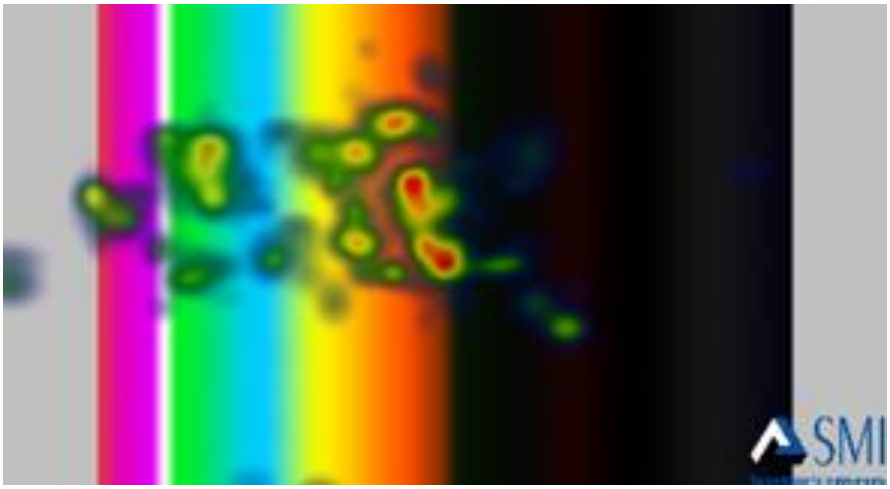


Figure 10. The heat map that demonstrates eye-gaze patterns over the AOIs after displaying a positive stimulus.

3.3. Sensory Evaluation

A paired sample t-test was conducted for each of the eight samples to investigate how participants used the colour scale to express their food-elicited emotion during the sensory evaluation.

Results showed significant differences in the dwell time (ms) between the eye-fixations on LCS and DCS with all samples except the orange juice bottle and coffee (Table 3). The means of dwell time on LCS for all samples had a higher value than the means of the dwell time on DCS.

When comparing the participants' general emotions using VEQ, significant differences were found between GPE and GNE with all samples except for the orange juice bottle. Participants' rating revealed higher positive emotions than negative emotions toward the samples (Table 3).

Significant differences between genders were found ($p < 0.05$) with a red bell pepper sample in dwell time on DCS, since males gave a longer dwell time on DCS than females (889.2 ms versus 2190.9 ms, respectively). Although gender had no impact on general emotions regarding red bell pepper samples, results showed that males also had a higher rating for negative emotions than females (mean = 1.2 for females versus 1.5 for males).

Table 3. Mean ratings of general positive and general negative emotions, and mean values of dwell time on the colour scale. In addition to the significant differences between GPE and GNE, and dwell time on the light colours versus the dwell time on the dark colours after testing each sample.

Sample	General Positive Emotion	General Negative Emotion	Dwell Time LCS (ms)	Dwell Time DCS (ms)
* E, D Apple	2.8	1.2	4383.2	827.7
* E, D Orange juice	2.6	1.4	3303	520.6
* E, D Walnuts	2.4	1.1	2853.3	1339.4
* E, D Oregano	2.6	1.4	2825.6	1348.1
* E, D Red bell pepper	1.9	1.3	3016.6	1344.8
* E Coffee	2.5	1.3	2363.3	1951.3
Orange juice bottle	1.9	1.7	2746.3	1359.3
* E, D Pear	2.2	1.2	3486.4	609.9

* Statistically significant. E: General emotion. D: Dwell time.

4. Discussion

To the best of our knowledge, this study is the first to employ emotion-colour association together with eye-tracking, as a non-intrusive method, to capture the rapid intuitive eye-fixation on a developed colour scale to detect how implicit food-elicited emotions can be expressed using colours. Moreover, the study uses time pressure conditions as a technique to reduce the conscious impact on the final response and avoid the deliberate reaction.

Our study casts a new light on the emotion-colour association and the prospect of using this association to gain insight into implicit emotions.

4.1. Emotion-Colour Association

Knowing that there is a lack of studies about ECA, this paper first conducted an experiment to investigate how people may use colours to express their emotions.

The first experiment combines SRQ, as an explicit measure, and eye-tracking, as an implicit measure, to study in-depth both explicit and implicit association between emotions and colours.

The present study confirmed the findings of the strong influence of colours on emotions (the colour-emotions association). Light colours evoked highly positive emotions, whereas dark colours made people feel discounted, sad, or evoked other negative emotions. However, the other dimension of the relationship between colours and emotions is also important. If the colours influence our emotions, can we use those colours in return to tell our positive or negative emotions?

Based on the results of this study, we can conclude that people tend to use light colours to express their positive emotions, and dark colours to express their negative emotions.

Orange, yellow, and green were the most frequently associated colours with the evoked positive emotions, while grey, brown, and black were the most chosen to express the negative evoked emotions. Orange, yellow, and green were reported to be of the greatest frequencies to reveal positive emotions in two previous studies since 1965 [28,29]. This refers to the importance of those three colours in telling positive emotions. Therefore, those three colours were the main colours in the

developed colour scale. Grey, black, dark green and dark blue were the most chosen colours after evoking negative emotions. Thus, they were included in the DCS of the developed colours scale as main colours.

White had very low frequencies when expressing both positive and negative emotions. These low frequencies may have resulted by considering "white" as a neutral colour, or the possibility of having different meanings. "White" may evoke the feeling of peace and hop since it is associated with purity and cleanness. On the other hand, it may elicit emotions of emptiness and loneliness [23]. Although red was the fourth in the rank to express positive emotions, it was the fifth chosen colour to express negative emotions. Consequently, red and white were excluded from the main colours included in the developed colour scale since they may hold a bilateral association.

SRQ was used as an explicit measure to allow participants to think and choose colour samples to express their emotions. On the other hand, eye-tracking, which is a powerful unobtrusive tool, was used as an implicit measure. In addition, literature reports that one of the most important methods to obtain intuitive responses and understand the innate behaviour is a time pressure technique [12,45]. Thus, this technique together with eye-tracking were applied in this study to have a better insight into the implicit emotion-colour association.

The eye-tracking results were consistent with SRQ. This is an important finding in the understanding of the ECA. The data showed that the participants chose to focus their eyes on LCS to express their evoked emotions after positive stimuli, while they expressed their negative emotions by focusing their eyes more on DCS. Thus, people can use light and dark colours to reveal their explicit and implicit general emotions.

Females had a higher dwell time on LCS and lower dwell time on DCS after positive stimuli, in addition to a higher dwell time on DCS after the negative stimuli. This shows that women were faster than men to determine the set of colours that expressed their emotions and fixed their eyes more often on it. Moreover, female participants may tend to link light colours to positive emotions and dark colours to negative emotions more than men do.

Neither the colour set's position (left or right) nor the stimulus' colour (chromatic or achromatic) had an impact on the participant choice.

This is an important finding for understanding the emotion colour association, which will be further employed in a new method.

Since the SRQ and the eye-tracking results were compatible regarding the powerful connection between emotion and colours, the current study takes the advantage of these results to employ the emotion-colour association into a new sensory evaluation measure, the colour scale, to investigate the implicit food-elicited emotions.

Regarding the food's characteristics that evoked positive/negative emotions, whenever the food was characterized with the features of tastiness, healthiness, and good environmental impact, it would be the most pleasant food to consume. However, when these three features were not present in one food, "tasty" would be the most important feature that gave people positive feelings. "Only healthy" and "only environmentally-friendly" features had much lower frequencies than "only tasty". This suggests that, even though people care about health and the environment, the taste of the food plays the leading role when it comes to having a positive emotional food experience.

On the other hand, when the participants described the food that evoked negative emotion, the frequencies of "tasty", "healthy, but not tasty" and "environmentally-friendly, but not tasty" were rather close. This emphasized the negative emotional impact of the absence of the ''tasty'' feature in the consumed food. The taste of a healthy or environmentally-friendly food must be, therefore, highly focused on in food processing and marketing in order to encourage consumers to become healthier and more sustainable.

4.2. Detecting the Food-Elicited Emotions Using the Developed Colour Scale

This part of the study attempts to verify the validity of using the developed colour scale in a sensory evaluation. Thus, a VEQ was applied together with the new colour scale to investigate the food-elicited emotions.

Our results show a dominance of the positive emotions in the sensory evaluation since the rating of GPE was higher than GNE in all eight samples. A further novel finding is that the current study demonstrates a strong consistency between the VEQ results and the colour scale method. In six out of eight samples, significant differences existed between the rating of GPE and GNE and between the dwell time on LCS and DCS. The higher rating of GPE was accompanied by a higher dwell time on the light colours of the colour scale to express the positive food-elicited emotions.

Even when no significant results were found, like with the orange juice bottle, red bell pepper, and coffee samples, a higher rating of GPE toward the sample was compatible with a higher dwell time on the light colour set to express the food-elicited emotions. The same resemblance was found between the negative emotion ratings and the dwell time on the dark colours.

This consistency highlights the possibility of using colours instead of words as a new tool to express general emotions. Moreover, it may refer to the capability of the developed colour scale as a non-intrusive method that avoids any deliberate action and obtains prompt responses to detect rapidly the implicit emotions in a sensory evaluation for a further understanding of consumer's behaviour.

5. Limitations and Suggestions for Further Research

Using colours to express the implicit emotions in the present work encourages more avenues for future research on using specific colours to express specific emotions.

As positive emotions dominate in a sensory evaluation over the negative emotions, an in-depth study presenting food samples that evoke more negative feelings is recommended to use to have better insight on how assessors may use the colour scale to express their food-elicited negative emotions. Cross-cultural research on similarities and differences in using the colour scale for expressing emotions is also recommended.

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Appendix A
Samples of pictures that were used in the negative and positive emotional stimuli.

Positive Emotional Stimuli

Negative Emotional Stimuli

Neutral Pictures

References

1. Meiselman, H.L. A review of the current state of emotion research in product development. *Food Res. Int.* 2015, *76*, 192–199. [CrossRef]
2. Delarue, J.; Lawlor, B.; Rogeaux, M. *Rapid Sensory Profiling Techniques: Applications in New Product Development and Consumer Research*; Woodhead Publishing: Cambridge, UK, 2014; pp. 71–100.
3. Mauss, I.B.; Robinson, M.D. Measures of emotion: A review. *Cogn. Emot.* 2009, *23*, 209–237. [CrossRef] [PubMed]
4. Laros, F.J.M.; Steenkamp, J.B.E.M. Emotions in consumer behaviour: A hierarchical approach. *J. Bus. Res.* 2005, *58*, 1437–1445. [CrossRef]
5. Collinsworth, L.A.; Lammert, A.M.; Martinez, K.P.; Leidheiser, M.; Garza, J.; Keener, M.; Ashman, H. Development of a novel sensory method: Image Measurement of Emotion and Texture (IMET). *Food Qual. Prefer.* 2014, *38*, 115–125. [CrossRef]
6. Winkielman, P.; Berridge, K.C. Unconscious Emotion. *Am. Psychol. Soc.* 2004, *13*, 120–123. [CrossRef]
7. Dane, E.; Pratt, M.G. Exploring Intuition and its Role in Managerial Decision Making. *Acad. Manag. Rev.* 2007, *32*, 33–54. [CrossRef]
8. Leeuw, E.D.D.; Joop Hox, D.D. *International Handbook of Survey Methodology*; Routledge: Abingdon, UK, 2008.
9. Tseng, K.C. Behavioural finance, bounded rationality, neuro-finance, and traditional finance. *Invest. Manag. Financ. Innov.* 2006, *3*, 7–18.
10. Beattie, G.; Sale, L. Shopping to Save the Planet? Implicit Rather than Explicit Attitudes Predict Low Carbon Footprint Consumer Choice. *Int. J. Environ. Cult. Econ. Soc. Sustain. Annu. Rev.* 2011, *7*, 211–232. [CrossRef]
11. Thomson, D.M.H.; Crocker, C.; Marketo, C.G. Linking sensory characteristics to emotions: An example using dark chocolate. *Food Qual. Prefer.* 2010, *21*, 1117–1125. [CrossRef]
12. Koola, P.M.; Benjamin, P.; Schatz, S.; Colombo, G. A Methodology for Capturing and Fusing Unconscious Cognition with Computation. *Procedia Manuf.* 2015, *3*, 4129–4135. [CrossRef]
13. Truong, K.P.; Neerincx, M.A.; Van Leeuwen, D.A. Measuring emotions using eye tracking Jakob. In Proceedings of the International Conference on Methods and Techniques in Behavioural Research, Maastrich, The Netherlands, 26–29 August 2008; p. 226.
14. Hanada, M. Correspondence analysis of colour–emotion associations. *Colour Res. Appl.* 2018, *43*, 224–237. [CrossRef]
15. De Bortoli, M.; Maroto, J. Colours across cultures: Translating colours in interactive marketing communications. In Proceedings of the European Languages and the Implementation of Communication and Information Technologies (Elicit) Conference (Elicit 2001), Paisley, UK, 9–10 November 2001; pp. 3–4.
16. Gil, S.; Le Bigot, L. Seeing Life through Positive-Tinted Glasses: Colour–Meaning Associations. *PLoS ONE* 2014, *9*, e104291. [CrossRef]
17. Gilg, A.; Barr, S.; Ford, N. Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures* 2005, *37*, 481–504. [CrossRef]
18. Hemphill, M. A Note on Adults' Colour–Emotion Associations. *J. Genet. Psychol.* 1996, *157*, 275–280. [CrossRef] [PubMed]
19. Kaya, N.; Epps, H.H. Colour-emotion associations: Past experience and personal preference. In Proceedings of the AIC 2004 "Colour Paint" Interim Meeting of the International Colour Association,

Porto Alegre,Brazil, November 2004; pp. 31–34.
20. Manav, B. Colour-emotion associations and colour preferences: A case study for residences. *Colour Res. Appl.* 2007, *32*, 144–150. [CrossRef]
21. Piotrowski, C.; Armstrong, T. Colour Red: Implications for applied psychology and marketing research. *Psychol. Educ.* 2012, *49*, 55–57.
22. Mahnke, F.H. *Colour, Environment, and Human Response: An Interdisciplinary Understanding of Colour and Its Use as A Beneficial Element in The Design of The Architectural Environment*; Wiley: Seoul, Korea, 1996.
23. Kaya, N.; Epps, H.H. Relationship between Colour and Emotion: A Study of College Students. *Coll. Stud. J.* 2004, *38*, 396–405.
24. Boyatzis, C.J.; Varghese, R. Children's emotional associations with colours. *J. Genet. Psychol.* 1994, *155*, 77–85. [CrossRef]
25. Hupka, R.B.; Zaleski, Z.; Otto, J.; Reidl, L.; Tarabrina, N.V. The colours of anger, envy, fear, and jealousy: A cross-cultural study. *J. Cross Cult. Psychol.* 1997, *28*, 156–171. [CrossRef]
26. Kaya, N.; Crosby, M. Colour associations with different building types: An experimental study on American college students. *Colour Res. Appl.* 2006, *31*, 67–71. [CrossRef]
27. Manav, B. Colour-emotion associations, designing colour schemes for urban environment-architectural settings. *Colour Res. Appl.* 2017, *42*, 631–640. [CrossRef]
28. Cimbalo, R.S.; Beck, K.L.; Sendziak, D.S. Emotionally Toned Pictures and Colour Selection for Children and College Students. *J. Genet. Psychol.* 1978, *133*, 303–304. [CrossRef]
29. Lawler, C.O.; Lawler, E.E., III. Colour-mood associations in young children. *J. Genet. Psychol.* 1965, *107*, 29–32. [CrossRef] [PubMed]
30. Gmuer, A.; Nuessli Guth, J.; Runte, M.; Siegrist, M. From emotion to language: Application of a systematic, linguistic-based approach to design a food-associated emotion lexicon German. *Food Qual. Prefer.* 2015, *40*, 77–86. [CrossRef]
31. Ares, G.; Jaeger, S.R. A comparison of five methodological variants of emoji questionnaires for measuring product elicited emotional associations: An application with seafood among Chinese consumers. *Food Res. Int.* 2017, *99*, 216–228. [CrossRef] [PubMed]
32. Hettiarachchi, A.A.; De Silva, N. Colour associated emotional and behavioural responses: A study on the associations emerged via imagination. *Built Environ. Sri Lanka* 2012, *11*, 21–27. [CrossRef]
33. Piqueras Fiszman, B.; Jaeger, S.R. The effect of product–context appropriateness on emotion associations in evoked eating occasions. *Food Qual. Prefer.* 2015, *40*, 49–60. [CrossRef]
34. Lang, P.J.; Greenwald, M.K.; Bradley, M.M.; Hamm, A.O. Looking at pictures: Affective, facial, visceral, and behavioural reactions. *Psychophysiology.* 1993, *30*, 261–273. [CrossRef]
35. Royet, J.P.; Zald, D.; Versace, R.; Costes, N.; Lavenne, F.; Koenig, O.; Gervais, R. Emotional Responses to Pleasant and Unpleasant Olfactory, Visual, and Auditory Stimuli: A Positron Emission Tomography Study. *J. Neurosci.* 2000, *20*, 7752–7759. [CrossRef]
36. Olofsson, J.K.; Nordin, S.; Sequeira, H.; Polich, J. Affective picture processing: An integrative review of ERP findings. *Biol. Psychol.* 2008, *77*, 247–265. [CrossRef]
37. Calvo, M.G.; Lang, P.J. Gaze Patterns When Looking at Emotional Pictures: Motivationally Biased Attention. *Motiv. Emot.* 2004, *28*, 221–243. [CrossRef]
38. Foti, D.; Hajcak, G.; Dien, J. Differentiating neural responses to emotional pictures: Evidence from temporal-spatial PCA. *Psychophysiology.* 2009, *46*, 521–530. [CrossRef] [PubMed]
39. Xing, C.; Isaacowitz, D.M. Aiming at Happiness: How Motivation Affects Attention to and Memory for

Emotional Images. *Motiv. Emot.* 2006, *30*, 243–250. [CrossRef]

40. Meyners, M.; Castura, J.C.; Carr, B.T. Existing and new approaches for the analysis of CATA data. *Food Qual. Prefer.* 2013, *30*, 309–319. [CrossRef]
41. Danner, L.; Sidorkina, L.; Joechl, M.; Duerrschmid, K. Make a face! Implicit and explicit measurement of facial expressions elicited by orange juices using face reading technology. *Food Qual. Prefer.* 2014, *32*, 167–172. [CrossRef]
42. Acker, F. Conscious versus unconscious thought. *Judgm. Decis. Mak.* 2008, *3*, 292–303.
43. Richins, M.L. Measuring Emotions in the Consumption Experience. *J. Consum. Res.* 1997, *24*, 127–146. [CrossRef]
44. Thompson, E.R. Development and Validation of an Internationally Reliable Short-Form of the Positive and Negative Affect Schedule (PANAS). *J. Cross Cult. Psychol.* 2007, *38*, 227–242. [CrossRef]
45. Kühn, S.; Brass, M. Retrospective construction of the judgement of free choice. *Conscious. Cogn.* 2009, *18*, 12–21. [CrossRef][PubMed]

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Chapter 3: Consumers' emotion attitudes towards organic and conventional food: A comparison study of emotional profiling and self-reported method

Diana Ismael * and Angelika Ploeger

Specialized Partnerships in Sustainable Food Systems and Food Sovereignty, University of Kassel, Kassel, Germany; a.ploeger@uni-kassel.de

* Correspondence: Correspondence: diana.ismael@uni-kassel.de; Tel.: +49-561-804-1717; Fax: +49-561-804-1713 (D.I)

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Abstract: Emotions represent a major driver behind consumption behaviour. It may provide more important information beyond consumers' preferences. This study contributes to a better understanding of the discrepancy in emotion attitudes towards organic versus conventional food using a cognitive survey and real food consumption experience. Emotional profiling under informed and uninformed condition, a cognitive survey and a rapid forced-choice test were carried out with 46 consumers. Our work detected a yawning gap in consumers' declared emotion attitudes in the cognitive survey and elicited emotion attitudes in the food consumption experience. Results showed that consumers exaggerate their positive emotion attitudes towards organic over conventional and their negative emotion attitudes towards conventional over organic. Even though consumers expressed higher negative emotion attitudes towards conventional food than organic in a cognitive survey, during the emotional profiling they had nearly equal emotion attitudes towards both conventional and organic samples. Moreover, positive declared emotions in a cognitive survey formed a good predictor of the final choice of conventional product over organic under time pressure. However, preferences, declared emotion as well as elicited emotion attitudes were less useful as predictors of organic choice under time pressure. These results show the importance of taking into consideration the type of applied method when investigating consumers' emotion attitudes towards organic and conventional products.

Keywords: Cognitive survey; emotional profiling; food-elicited emotions; food-declared emotions; emotion attitude; colour scale; eye-tracking; organic food; conventional food

1. Introduction

We often face a situation where we go to a supermarket thinking about a tasty healthy dinner we want to prepare and having intentions to buy all the ingredients as organic, then, we end up buying less organic than we had planned. Our final behaviour could be explained due to the unavailability, high prices, unattractive sensory attributes of the organic product, or simply lacking the emotional motivation.

This situation is acknowledged by researchers as the Intention-Behaviour Gap (IBG). IBG denotes a situation in which consumers hold high positive attitudes and intention towards a specific purchase behaviour, though their actual behaviour falls short to this attitude and intention [1–3].

Organic food has been defined by researchers as a food with credence attributes, which are the attributes that cannot be ascertained by the consumer before the purchase or after the consumption [4]. Over the years, consumers have become increasingly concerned with the credence attributes of organic products such as health benefits, environmental-friendliness and animal welfare. Driven by those attributes, the organic food has moved from being just a favoured or prestige product to a

"must-have" product. Though the organic food market is usually the most representative market of IBG where consumers usually declare positive attitudes towards organic food, yet they end up purchasing a smaller amount or even not purchasing any [1,3,5–8].

Most of the theories of IBG in organic food consumption focus on attributing the gap to different barriers such as price, availability, lack of trust, lack of knowledge, habits, and overall liking [3,9–12]. Nevertheless, the studies that investigate the key role of emotions in the final choice between organic or conventional food are still scarce. Research on food—emotion association report that consumer's food-related emotions may provide additional information beyond overall liking, and better predict the consumer's preference and food choice behaviour [13–20].

Emotions represent the major driver behind consumption behaviour [21]. Previous studies demonstrate the impact of emotions on organic food choice and acknowledge the importance of several emotions such as pride, guilt, fear, empathy, and disdain in prompting the green consumption behaviour [6,22–25]. Conversely, the influence of food consumption on consumer's emotions and the relationship of this food–emotion association with regard to food acceptance and preference has only gained attention recently in consumer and sensory research [13,16,21,26,27]. The latter attention has led to the development of various methods to capture consumers' explicit as well as implicit emotional attitude towards food.

The most commonly used approach to study explicit food-related emotion attitudes is the self-reported method in which participants declare themselves their food-related emotion attitudes such as interviews, or verbal or nonverbal questionnaires [28]. This method measures the conscious subjective emotion attitudes [29]. On the other hand, the implicit measurements of food-related emotions are indirect and non-self-reported methods and can detect emotions while participants are testing the food without the need of a cognitive translation during or after the testing [20,30,31] such as the colour scale method [32].

However, the question is, do the respondents of a self-reported method declare the same attitude they express when going under a real behavioural condition? Researchers observed a gap between the responses declared in a self-reported measure and the detected responses during a given task [2,33–35], in particular with attitudes related to "green behaviour". Several studies reported that people may exaggerate their attitudes and tend to appear "greener" than they actually are [2,33]. This can be ascribed to the actual barriers that may control the final behaviour or to the social desirability of being seen as a green consumer [36–38].

Given the great importance of emotions towards organic and conventional food with respect to the final choice, it is crucial to understand the explicit and implicit food-related emotions towards both types of food. A better understanding of consumer's food-related emotions provides a new way of thinking about the motivational basis of consumers' behaviour, which could be a critical advantage for organic against conventional food choice.

The presented work hypothesizes that the self-reported measure is a poor predictor of the real consumers' emotion attitudes towards organic and conventional food. This research, thus, constitutes a relatively new attempt to investigate the emotion attitudes gap between the food-declared emotions in a self-reported questionnaire and the food-elicited emotions detected during an informed and uninformed food consumption experience towards organic and conventional food using explicit and implicit methods. In addition, the study investigates the impact of organic purchase intention and behaviour on emotion attitude towards organic food, and vice versa.

Moreover, people tend, under time pressure, to rely on their underlying implicit attitudes to guide their food choices. Time pressure method combined with forced-choice limit the extensive information processing and, thus, decrease the influence of explicit preference and increasing the probability of obtaining more implicit attitudes [2,39,40]. Since some choices at marketplace may be taken under a degree of time pressure, therefore, this study explores the relationship between the consumer's rapid forced-choice and their preferences, implicit and explicit emotions to understand the effect that those factors may have on consumer's rapid choice.

2. Materials and methods

This study employed a self-reported questionnaire (hereafter referred to as the "cognitive survey") and a consumer test (hereafter referred to as "emotional profiling") under informed and uninformed conditions in order to investigate consumers' emotion and attitudes towards organic and conventional food. In addition, a rapid forced-choice test took place as the final step of this experiment. Figure 1 demonstrates the experimental design.

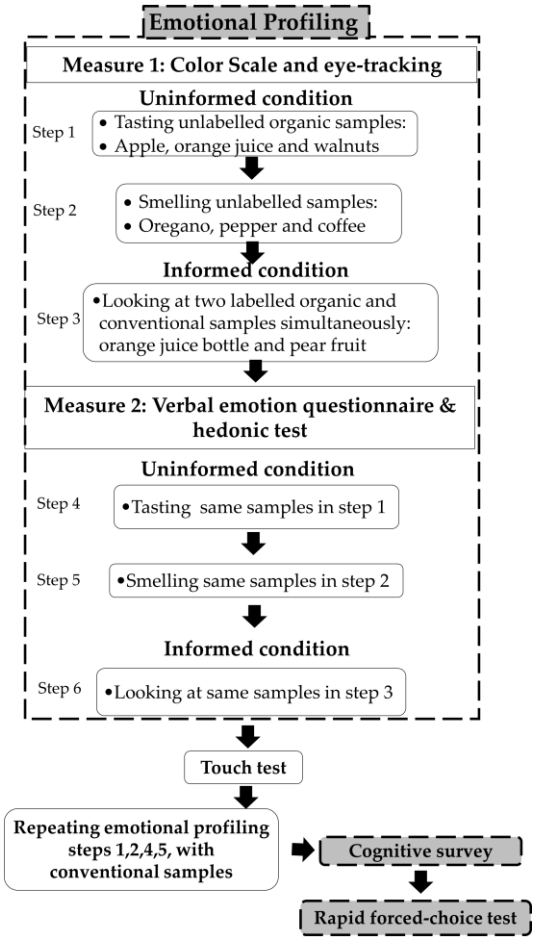

Figure 1. The experimental design that demonstrates the procedures of informed, uninformed emotional profiling, touch test, cognitive survey, and the rapid forced-choice test.

Forty-six consumers volunteered to take part in this research study. Consumers were invited to take part in the experiment throughout invitations sent via emails as well as social media or in person. Each consumer attended individually one experimental session that lasted about 40 min. The experiment took place in standard booths at the sensory facilities of Kassel University and at Fulda University of Applied Sciences.

All individual experiments were carried out in the same booth under the same conditions. None of the consumers reported having ageusia, anosmia, dyschromatopsia, or colour blindness. The difficulty of being eye-tracked was the main criterion of recruiting consumers.

Upon entering the sensory lab, the consumers were thanked and given a short introduction to the sensory facility. A friendly conversation preceded the experiment to relax the participants and release any stress they have that may affect their responses. Subsequently, consumers received a verbal and written introduction about the procedures. However, no additional information was given about the purpose of the experiment.

The emotional profiling preceded the cognitive survey to avoid giving the consumers any prior idea that organic and conventional samples will be used in this experiment. Thus, maintaining their

concentration on the food-elicited emotions and overall liking rather than the attempt of realizing the nature of the tested sample (whether organic or conventional produced).

2.1. Emotional Profiling

Emotional profiling with food testing (taste, smell, and visual testing) was conducted, considering the conditions of ISO 8589 standards to study consumers' food-related emotions (hereafter referred to as "food-elicited emotions") and overall liking towards organic and conventional food samples.

2.1.1. Samples

As shown in Table 1, 21 samples in total were used in this experiment. Out of the 21 samples, 18 were organic and conventional samples that constituted eight food pairs (apple, orange juice, walnut, oregano, red bell pepper, coffee, pear fruit, and orange juice bottles). The food pairs were served in a sequential monadic design. In addition, materials that represent nature (e.g., grass and stones), price (e.g., coins), and health (e.g., apple) aspects of organic products were used in a touch test.

The food samples were chosen to be usually available in the supermarkets and widely used by most of the consumers. The names of the samples were announced in the experiment invitation to avoid allergy reaction that consumers may have against any of the samples. Fresh samples were served in room temperature using small glass bowls for apple and walnut samples, a 100 mL glass for processed orange juice, a 250 mL opaque beaker for oregano, red bell pepper, and raw coffee. All consumers received the same portion size of each sample. The samples in the touch test were served in paper envelops, while in the rapid forced-choice test, the samples were placed inside a tuck-in-flap box.

Table 1. Type and specification of the samples that were used in the emotional profiling.

		Sample Type and Description		
Taste	Unlabelled sample	Apple Fresh fruit (Royal gala)	Orange juice Processed juice	Walnut Raw, unsalted
Smell	Unlabelled sample	Red bell pepper Fresh	Oregano Spices	Ground coffee Valve-sealed bags
Visual	Labelled sample	Pear Fresh fruit (Abate Fetel)	Orange juice 33cl bottle	
Touch	Sample	Coins and banknotes	Fresh grass, stones, tree branches, and soil	Apple and cotton wool balls
	Indication	Indicates the price value of an organic product	Indicates the environmental friendliness value	Indicates the health value
Rapid forced-choice	Labelled sample	A 33cl bottle of Orange juice		

2.1.2. Procedures

The emotional profiling design was developed in the following way. First, taste and smell tests took place respectively in uninformed conditions with unlabelled organic food samples and with no information about the nature of the sample. Next, a visual test in informed conditions took place with a simultaneous serving of organic and conventional labelled samples of the same type. After that, participants underwent a touch test. Then, participants repeated the taste and smell tests with unlabelled conventional samples. The implicit food-elicited emotions were measured first using the

colour scale with eye-tracking, while the explicit food-elicited emotions were measured after using a verbal emotion questionnaire.

Colour scale and eye-tracking measure. The colour scale is a newly developed method that is used to detect the implicit emotions and consists of two sets of colours: light colours and dark colours. In a previous study [32], it was proven that participants focus on the light colours to express positive emotions and the dark colours to express their negative emotions [32,39]. The eye-tracking data were obtained using an individual laptop equipped with the portable SMI RED-250 mobile eye-tracker powered by USB. The screen-based eye-tracker is manufactured by SensoMotoric Instruments (SMI, , Germany) and has a sampling rate of 60 Hz. Consumers were provided with instructions on the working mechanism of the eye-tracker.

The emotional profiling was pretested with 13% of the consumers (the pretest data were not included in the final analyzed data) in order to (i) guarantee the optimal experiment design, (ii) define the optimum position of the participant in the booth that allows them to test the sample adequately and at the same time obtain the best results by the eye-tracker, and (iii) avoid boredom by determining the best adequate given time for testing the samples before the automatic appearance of the colour scale. A testing period of 20 s among other pre-examined periods by the experimenter (15, 20, 40, and 60 s) was chosen as the optimal period to have an impression (food-elicited emotions) without getting fatigued [30].

In the beginning, participants were seated in the best position that guaranteed the ideal functionality of the eye-tracker. Then, a simulation trial was conducted to familiarize participants with the use of the new colour scale and the eye-tracker. Participants were asked to taste, smell, and look at the sample while focusing on their emotions that would be elicited by the sample.

When the sample is being served, an instruction of "Please press Enter when you are ready to test the sample" was displayed on the screen. The consumers then were given a period of 20 s to test the sample, in the meantime, a white screen was being displayed on the laptop. After 20 s, the colour scale was automatically displayed on the screen for 5 s. Consumers were instructed to use the colour scale to express their food-elicited emotions by fixing their eyes on the colour set that expresses the most these emotions.

The light and dark colours position of the colour scale was reversed randomly to avoid the bias resulting from presenting the same set of colours on the same side of the screen. To avoid eye-fixation bias that may result from the last eye-fixation tendency, a light-grey cross was shown in the center of the white screen at the end of the 20 s and 2 s prior to the appearance of the colour scale [42,43]. After the disappearance of the colour scale, consumers signaled to be served the next sample and so forth. Water in room temperature was used as a palate cleanser between samples.

Verbal emotion questionnaire. A verbal emotion questionnaire, of 5-point scale (1 = I do not feel it at all, 5 = I strongly feel it) with a rate-all-that-apply (RATA) method, was used in the emotional profiling to detect consumers' explicit emotions. The verbal emotion questionnaire consisted of 12 emotion words of which six were positive emotion terms (active, satisfied, optimistic, proud, happy, and encouraged) and six were negative emotion terms (guilty, ashamed, angry, sad, regretful, and scared). The order of presenting the emotion terms was randomized among all samples.

After completing the emotional profiling with all samples using the colour scale measure, consumers were asked to taste the sample again (if needed) and use the verbal emotion questionnaire to declare their deliberate explicit food-elicited emotions. In addition, they were asked to rate their overall liking using a hedonic scale of 5-point: 1 = "strongly dislike", 5 = "strongly like").

Touch test. Organic products are perceived by consumers in different manners. Some consumers perceive it as environmentally friendly products more than healthy products and vice versa. Others perceived it as a premium priced product. This part intended at investigating the consumers' perceived aspect of organic products concept by allowing the participants to touch representative materials of each concept. Three groups of representative items were used in this test. The first group represented the environmental-friendliness aspect and contained plant leaves, rough bark, grass, and

roses. The second group represented the health aspect and contained cotton and apple. The third group contained coins and banknotes that were meant to refer to the consumers' perception of price premium of organic food products. The materials were put in paper envelops and coded with three-digit codes.

Participants were provided with an explanation of the purpose from each group and instructed to conduct a blind test by touching the items inside the envelopes only with their hands without looking inside. They were informed that they should not expect any danger or unpleasant surprises. Then they were asked to rate each representative item "Touch the samples inside each bag from left to right, then rate to what extent each sample represents the way you think of an organic product".

After this step, participants took a rest (if needed) and repeated the emotional profiling (taste and smell) with conventional food samples (Figure 1).

2.2. Cognitive Survey

After the emotional profiling, consumers answered the cognitive survey. The main purpose of the cognitive survey was to investigate the following:

Food-declared emotions (emotion attitude): consumers' positive and negative emotions (hereafter referred to as "food-declared emotions") towards organic and conventional food in general were measured using the same verbal emotion questionnaire that was used in the emotional profiling.

Purchase Intention: this part aimed to assess consumers' willingness to buy organic food with a scale ranging between "I wish to buy all my food products as organic" and "I do not wish to buy any organic food".

Purchase actual behaviour: this part aimed to explore the consumers' actual purchase behaviour of organic food. Consumers were asked to choose one out of five scale-statements ranging between "All my food purchases I currently buy are organic'' and '' I don't buy any organic food".

Organic product concept: this part intended to investigate the consumers' perceived aspect of organic product concept through self-reporting. Participants were asked to rate three aspects of organic food concept: premium priced products, environmentally friendly products, and health products. The results of this part of the cognitive survey were intended to be compared with the results from the touch test.

Factors influencing organic food consumption behaviour: according to previous studies, credence attributes (e.g., health benefits, animal welfare, and environment), in addition to the taste and appearance are among the strongest drivers behind organic food consumption behaviour [44,45]. This part aimed to explore the strongest factor that influences the consumer's organic behaviour.

Subjective well-being: the current study investigated the consumers' perception of the impact of the intention-behaviour gap in their organic food consumption on their well-being status [46,47]. This part of the survey started with a short introduction to the common definition of well-being. Then consumers rated their agreements on statements that link their organic food consumption to their well-being status "I believe that consuming organic food is one of the main factors behind having a good well-being". Finally, consumers were asked to rate their perception on the negative impact that IBG may have on their well-being status "When I go to the market having the intention to buy organic food, but then due to whatever reason I end up not buying it all organic as I wished for. I think this purchasing behaviour might have a negative impact on my well-being". The rating was done using a 5-point agreement scale "1 = strongly disagree, 5 = strongly agree".

2.3. Rapid Forced-Choice Test

As a final step of this experiment, consumers took the rapid forced-choice test under time pressure condition after completing the cognitive survey. Consumers had to make an immediate choice and grab rapidly one of two orange juice bottles (organic and conventional produced) placed inside a closed tuck-in-flap box that was going to be opened for only 2 s "you have only two seconds

starting from the moment the box is opened to grab one of whatever exists inside". Consumers had no clue what was inside the box.

The orange juice bottles placed inside the box were the same bottles served in the informed emotional profiling. Thus, consumers' overall liking and elicited emotion attitude towards both bottles were previously examined. However, consumers were not informed at any point of the experiment that the rapid test will be conducted with the same bottles. The organic juice bottle was made of cartoon material, while the conventional juice bottle was made of plastic. The two bottles had the same size and almost the same colour except for the caps (Appendix A). Their position inside the box was changed randomly among consumers to avoid the bias that may result from presenting each bottle in the same position.

On completion of the experiment, the orange juice bottle that was chosen in the rapid forced-choice was offered to the consumers as a small token of thanks. Consumers had the choice later to change the bottle they grabbed first. However, the data that was considered for analysis was their first choice.

During the whole experiment, participants were free to take a short break (3–5 min) between the steps whenever they needed to.

2.4. Data analysis

The collected data was analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistics version 24, Armonk, NY, USA). First, descriptive statistics were used to summarize the consumers' demographic characteristics. One participant was excluded as the consumer did not accomplish the simulation trial because of his/her inability to be eye tracked and deliver quality data.

For analytical purposes, positive emotion terms (happy, optimistic, proud, active, satisfied, and encouraged) were computed and considered as the general positive emotions, while the negative emotion terms (sad, guilty, ashamed, regretful, angry, and scared) were considered as the general negative emotions.

The data of the verbal emotion questionnaire were analyzed using paired *t*-test to study the significant differences in general emotions between organic and conventional samples. ANOVA was performed for each sample to investigate the differences in general emotions between genders.

Spearman's rho test was used to investigate the correlation between overall liking and general positive emotions.

In order to detect any significant differences in dwell time on light colours and dark colours after each organic and conventional sample, the eye-tracking data were analyzed conducting the Wilcoxon signed-rank test. In addition, the Wilcoxon signed-rank test was used to detect the IBG in consumers' organic food consumption.

The Mann-Whitney test was used to investigate the differences in the dwell time on the colour scale per sample between genders. Besides, the test was used to study the gender impact on purchase intentions and behaviour.

The Kruskal–Wallis test was performed to understand the relationship between the patterns of organic food purchase behaviour and the start period of consumption.

A generalized linear model was used to explore the correlation between the final choice of organic versus conventional juice bottle and (i) purchase behaviour patterns, (ii) overall liking, and (iii) the general positive emotions. In addition, the relationship between consumers intention to buy organic and their positive emotion attitude towards organic was investigated.

3. Results

Forty-six consumers aged between 19 and 48 years took part in this experiment. Based on the results of the cognitive survey, Table 2 demonstrates the demographic and other characteristics of the consumers. The majority of the consumer sample (96%) had a moderate to a very good level of knowledge of organic food. A total of 75% of the consumers were students, 20% were employees,

while 5% were neither students nor employees. The results showed no significant impact of participants' level of education or occupation on their purchase intentions or behaviour.

Environment was the highest rated motivating factor behind organic food consumption. Health was rated after both animal welfare and taste as the fourth driving factor behind organic food consumption.

Table 2. Consumers' demographic characteristics, organic purchase intention and behaviour, in addition to the motivating factors behind the organic food purchasing. The data was collected from the cognitive survey.

Demographic Characteristics	Category	Percentage/ Mean
Gender *(%)*	Female	65%
	Male	35%
Education (%)	University level	75%
	High school	25%
	Less than high school	0%
Occupation (%)	Student	75%
	Employee	20%
	Neither	5%
Knowledge of organic food concept (%)	Very good knowledge	15%
	Good knowledge	58%
	Moderate knowledge	23%
	Poor knowledge	3%
	Very poor knowledge	3%
Organic food consumption behaviour (%)	All the food purchases are organic	13%
	Most of the food purchases are organic	40%
	Half of the food purchases are organic	28%
	Only few of the food purchases are organic	18%
	None of the food purchases are organic	3%
Organic food consumption intention (%)	I wish to buy all food purchases as organic	76%
	I wish to buy most of the food purchases as organic	10%
	I wish to buy half of the food purchases as organic	5%
	I wish to buy only few of the food purchases as organic	8%
	I do not wish to buy any organic food	3%
Started consuming organic food (%)	Recently (< 5 years)	18%
	Since few years (> 5 years)	54%
	Since I was a child	28%
Motivating factors influencing the organic food consumption behaviour (5-point scale)	Protecting the environment	4.72
	Animal welfare	4.33
	Taste	3.90
	Health	3.75
	Appearance	2.77
	Rewarding yourself	2.55
Perceived aspect of organic food products (5-point scale)	Environmentally friendly products	4.18
	Healthy products	3.98
	High price products	3.45

Data showed no significant relationship between organic food purchase patterns and the starting period of organic food consumption (recently, few years ago, or since childhood). Yet, 82% of

consumers who started consuming organic food since childhood stated that most to all of their food purchases are organic. In addition, the Mann-Whitney test showed no gender impact on consumers' purchase behaviour or purchase intentions.

3.1. Food-Elicited Emotions vs. Food-Declared Emotions

3.1.1. Organic vs. Conventional Samples

In the cognitive survey, consumers were asked to use the verbal emotion questionnaire to declare their positive food-declared emotions (Dec.PE) and negative food-declared emotions (Dec.NE) towards organic and conventional food in general (Figure 2).

The paired *t*-test showed that Dec.PE towards organic food were significantly higher ($p < 0.05$) than the Dec.PE towards conventional food, while Dec.NE towards conventional food were significantly higher ($p < 0.05$) than towards organic food. In addition, a significant difference ($p < 0.01$) was found between the Dec.PE and the Dec.NE towards organic food (Appendix B). No significant difference was found between Dec.PE and Dec.NE towards conventional food.

ANOVA detected no gender impact on food-declared emotions towards both organic and conventional food. In the emotional profiling tests, on the other hand, explicit food-elicited emotions, positive food-elicited emotion (Eli.PE), and negative food-elicited emotions (Eli.NE), towards organic and conventional food samples were measured with the verbal emotion questionnaire. Figure 2 demonstrates Eli.PE and Eli.NE for each sample. The paired *t*-tests resulted in significant differences ($p < 0.05$) between Eli.PE and Eli.NE with all samples except for the conventional orange juice bottle.

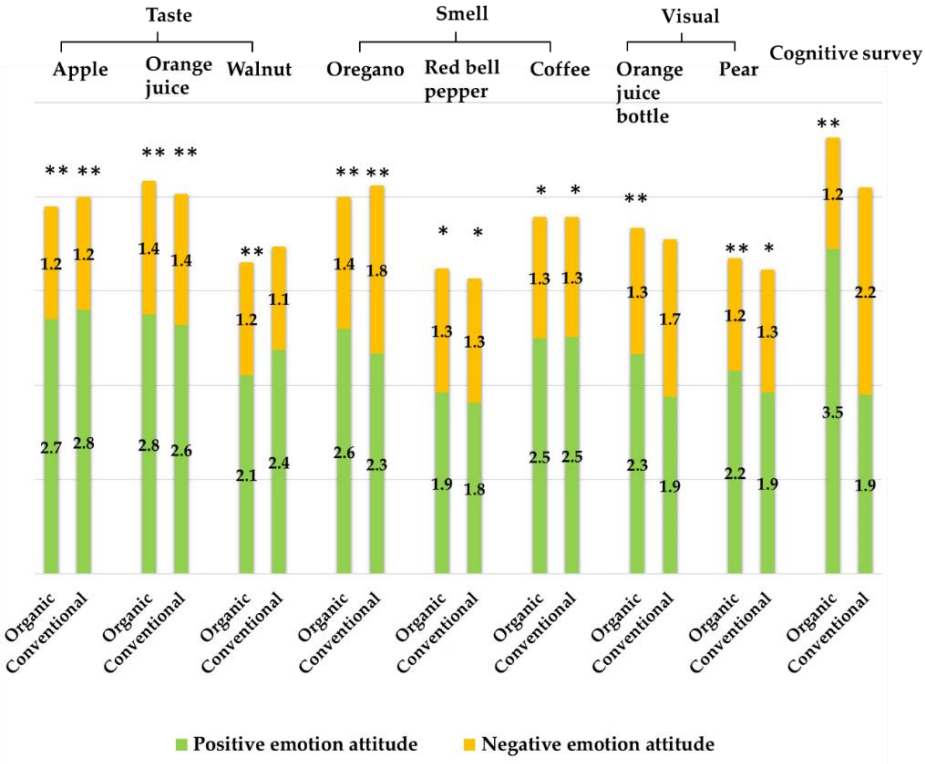

Figure 2. Emotion attitudes: food-elicited emotions expressed in the emotional profiling for each sample, and food-declared emotions declared in the cognitive survey. The data represents the rating values using the verbal emotion questionnaire of a 5-point scale: 1 = I do not feel it at all, 5 = I strongly feel it. (*) Significant differences between positive emotions and negative emotions: * $p < 0.05$, ** $p < 0.01$.

In addition, results showed no significant differences neither in positive nor negative emotions between organic and conventional samples except for oregano and orange juice bottle. Consumers rated their Eli.PE towards organic orange juice bottle and oregano samples higher than the conventional samples, while they rated their Eli.NE towards conventional orange juice bottle and oregano samples higher than the organic samples (Appendix B).

ANOVA showed no gender impact on food-elicited emotions towards organic and conventional samples.

Table 3 displays the highest three rated emotion terms that were used by the consumers to express their food-elicited and food-declared emotions. Happy, optimistic, and active were the highest-rated emotion terms used in the cognitive survey to declare consumers' emotions towards organic food. Guilty, regretful, and happy were the highest used terms to declare emotions towards conventional food. Similar to the cognitive survey, happy, active, and optimistic were the most used and highest rated terms to express food-elicited emotions for all samples in the emotional profiling. Yet, guilty, sad, and happy were the most used terms to express emotions towards the conventional orange juice bottle.

Table 3. Mean values (± SD) of the highest three rated emotion terms (active, satisfied, optimistic, proud, happy, encouraged, guilty, ashamed, angry, sad, regretful, scared, and angry), on a 5-point scale (1 = I do not feel it at all, 5 = I strongly feel it), that were used to express the food-elicited emotions in the emotional profiling and the food-declared emotions in the cognitive survey.

Samples		Emotion 1	Mean	± SD	Emotion 2	Mean	± SD	Emotion 3	Mean	± SD
Apple	Organic	Happy	3.23	1.37	Active	2.90	1.31	Optimistic	2.85	1.39
	Conventional	Happy	3.46	1.23	Optimistic	2.85	1.33	Active	2.79	1.44
Orange juice	Organic	Active	3.28	1.32	Happy	3.13	1.32	Optimistic	2.82	1.35
	Conventional	Happy	3.51	1.39	Optimistic	3.08	1.35	Active	2.90	1.35
Walnut	Organic	Happy	3.59	1.50	Active	2.21	1.30	Optimistic	2.26	1.37
	Conventional	Happy	2.85	1.51	Optimistic	2.59	1.52	Active	2.26	1.31
Oregano	Organic	Optimistic	2.85	1.33	Happy	2.82	1.45	Active	2.51	1.30
	Conventional	Happy	3.13	1.49	Optimistic	2.97	1.42	Active	2.87	1.36
Red bel pepper	Organic	Active	2.21	1.26	Happy	2.18	1.27	Optimistic	2.15	1.31
	Conventional	Active	2.10	1.12	Optimistic	2.00	1.08	Happy	1.95	1.07
Coffee	Organic	Happy	2.95	1.62	Optimistic	2.90	1.55	Encouraged	2.79	1.63
	Conventional	Happy	3.03	1.56	Optimistic	2.74	1.50	Active	2.74	1.58
Pear fruit	Organic	Happy	2.49	1.34	Optimistic	2.59	1.29	Active	2.36	1.20
	Conventional	Happy	2.29	1.23	Optimistic	2.23	1.27	Active	2.03	1.27
Orange juice bottle	Organic	Happy	2.95	1.52	Optimistic	2.59	1.31	Satisfied	2.51	1.20
	Conventional	Guilty	2.00	1.32	Sad	1.97	1.27	Happy	2.00	1.05
Cognitive survey	Organic	Happy	4.00	1.11	Optimistic	3.78	1.17	Active	3.40	1.00
	Conventional	Guilty	2.60	1.31	Regretful	2.47	1.18	Happy	2.75	1.10

A newly developed colour scale, combined with an eye-tracking tool under time pressure condition, was used in the emotional profiling to detect implicit food-elicited emotions. Participants were asked to use the colour scale displayed on the screen (for 5 s) and focus on the colour set that expresses their food-elicited emotions after testing the sample. Dwell time on each of the light and the dark colours was calculated. Participants usually use the light colours to express implicit positive emotions, while they use the dark colours to express implicit negative emotions [32]. Similar to the results of the verbal emotion questionnaire, the Wilcoxon signed-rank test showed no significant differences in implicit food-elicited emotions ($p < 0.05$) between organic and conventional samples.

Significant differences in dwell time between light colours and dark colours were found for all samples except for the organic walnut, organic, and conventional coffee and conventional orange juice bottle. Figure 3a–c elucidates the average dwell time on each set of colours in the colour scale.

The Mann–Whitney test showed a significant difference between males and females in dwell time on dark colours after tasting organic walnuts, where women had higher dwell time (2856 ms)

on the dark colours than men (1345 ms), and smelling organic red bell pepper, where men had higher dwell time (2190 ms) on the dark colours than women (889 ms).

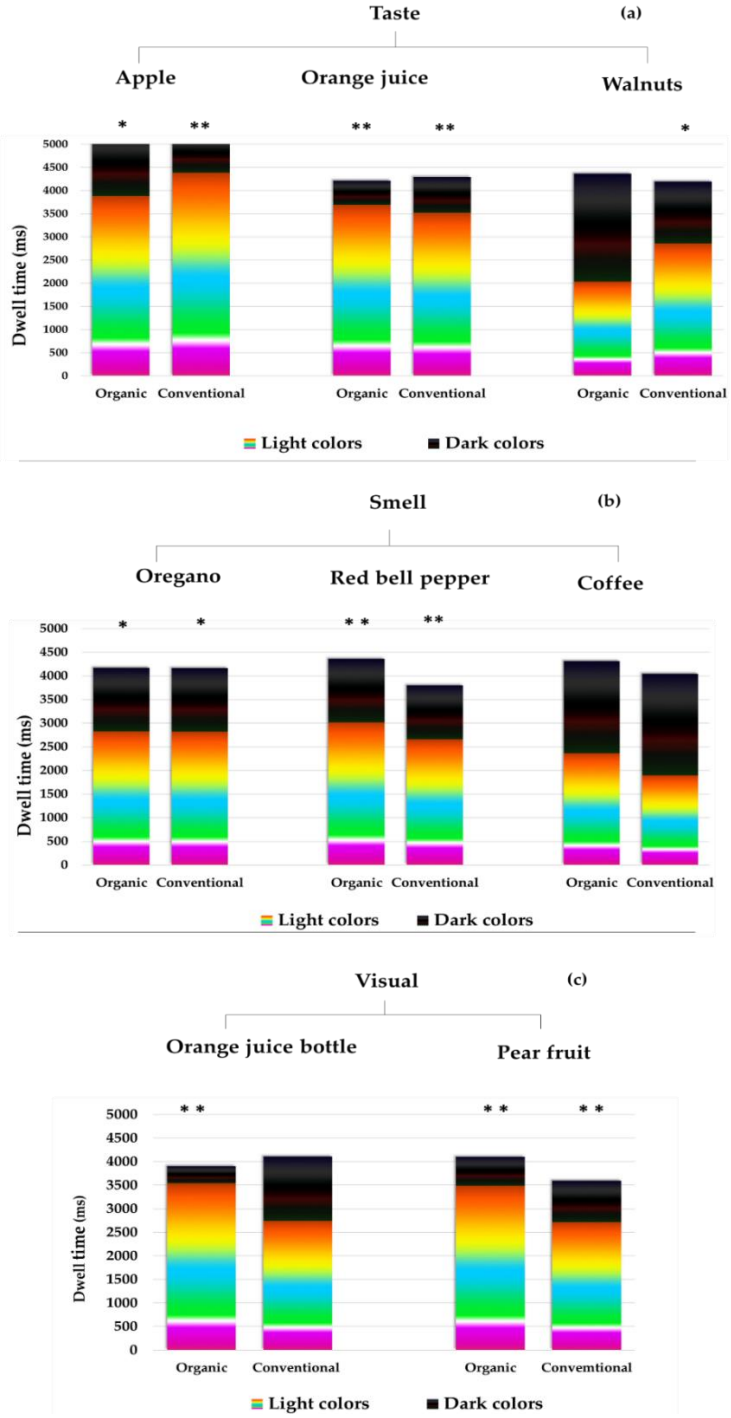

Figure 3. Dwell time in milliseconds on light colours and dark colours to express implicit food-elicited emotions towards organic and conventional samples in the emotional profiling using the colour scale. The display time of the colour scale on the screen lasted for 5000 ms. (*) Significant differences in dwell time between light colours and dark colours (*$p < 0.05$, **$p < 0.01$). (a) The results of the taste test, (b) smell test, and (c) visual test.

3.1.2. Cognitive Survey vs. Emotional Profiling

In the cognitive survey, consumers rated their Dec.NE of conventional food higher than Dec.PE, while in the emotional profiling their Eli.NE of all conventional samples were always rated lower than Eli.PE.

When comparing the emotions between the cognitive survey and the emotional profiling towards the conventional food/sample, Dec.NE towards conventional food in the cognitive survey were significantly higher ($p < 0.05$) than Eli.NE towards all conventional samples in the emotional profiling. In contrast, consumers' Dec.PE towards conventional food in the cognitive survey were significantly lower ($p < 0.05$) than their Eli.PE towards conventional samples in the uninformed emotional profiling, except for red bell pepper. However, Dec.PE for conventional food in the cognitive survey were not significantly different from the Eli.PE towards the conventional samples in the informed emotional profiling.

In terms of organic samples, positive elicited emotions towards all organic samples in the emotional profiling were significantly lower ($p < 0.05$) than the declared positive emotions towards organic food in the cognitive survey. Nevertheless, there were no significant differences in negative emotions between the cognitive survey and the emotional profiling except for orange juice sample in the taste test.

3.2. Consumers' Preferences: Organic vs. Conventional Food

As shown in Figure 4, no significant differences in overall liking between organic and conventional samples were found with all the samples except for the orange juice bottles. The taste of conventional samples was slightly more liked by consumers than the taste of the organic ones, while the smell of the organic samples was slightly more liked than the conventional ones. In the informed emotional profiling, consumers liked the organic orange juice bottle significantly more than the conventional juice bottle ($p < 0.05$), while they liked both the organic and conventional pear fruits almost the same.

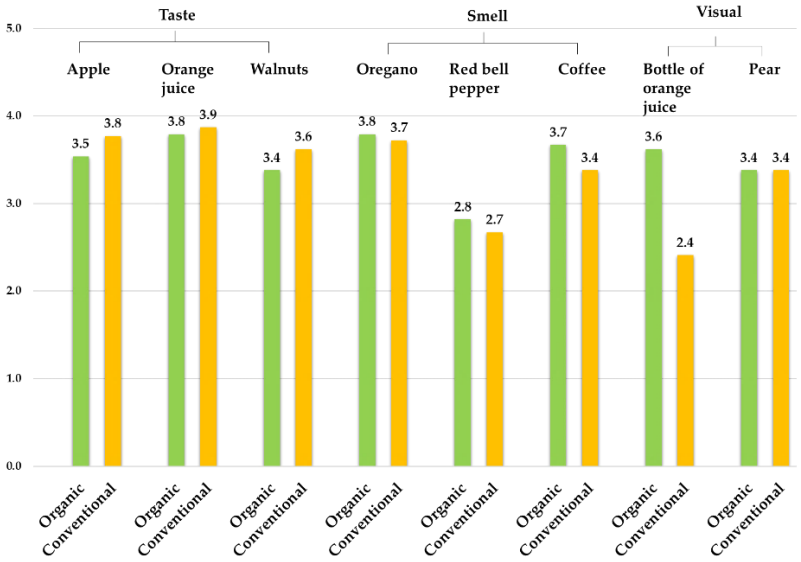

Figure 4. Overall liking mean values for each of the sample (organic and conventional products) on a 5-point scale: 1 = I strongly dislike, 5 = I strongly like.

Furthermore, as shown in Table 4, Spearman's correlation test revealed a significant moderate to a very strong correlation between overall liking and positive elicited emotions for each of the samples. The high rates of positive emotions were associated with higher rates of overall liking.

Table 4. Spearman's correlation measures the strength of association between overall liking and positive elicited emotions.

Overall Liking									
Positive elicited emotions	Sample	Apple	Orange	Walnut	Oregano	Pepper	Coffee	Juice bottle	Pear fruit
	Organic	0.661 **	0.641 **	0.619 **	0.719 **	0.769 **	0.696 **	0.595 **	0.606 **
	Conventional	0.812 **	0.438 **	0.682 **	0.658 **	0.623**	0.707 **	0.581 **	0.448 **

**$p < 0.05$.

3.3. Organic Food Concept: Cognitive Survey vs. Touch Test

In the cognitive survey, the organic product was perceived more as an environmentally friendly product, than as a healthy product, and finally as an expensive product. Results from the touch test were consistent with regards to the environmentally friendly aspect, while premium price and health aspects differed but still had very close rate values.

Figure 5 illustrates the comparison results between the participants' perception of the three mentioned aspects. Significant differences between the responses in the cognitive survey and touch test were found in premium price and health aspects. Participants rated those two aspects in the cognitive survey higher than in the touch test.

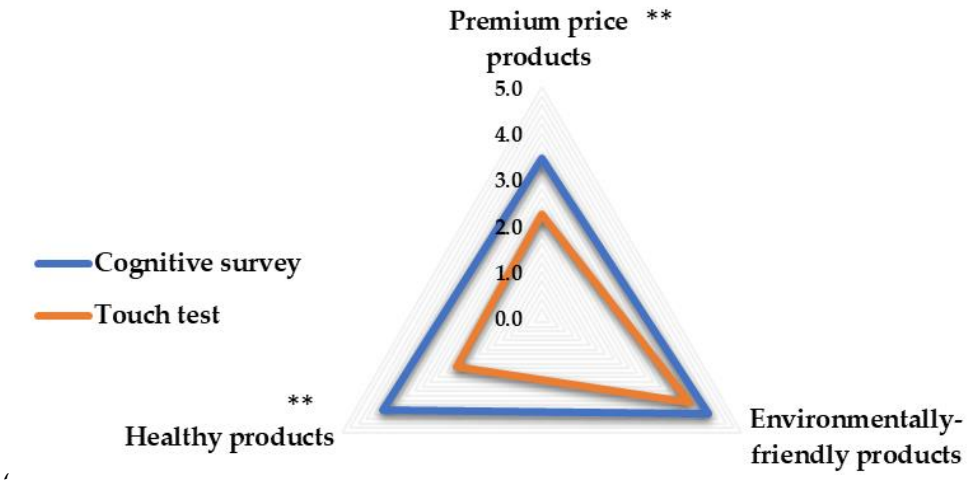

Figure 5. Spider diagram showing the differences in participants' perceived aspect of organic product concept between the cognitive survey and the touch test. The rating was done on a 5-point scale: 1 = it does not represent the concept of the organic product at all, 5 = it highly represents the concept of the organic product. (*) Significant difference in the responses between the cognitive survey and touch test, **$p < 0.01$.

3.4. Intention-Behaviour Gap (IBG)

As shown in Table 2, 76% of the consumers held high intentions to buy all their food purchases as organic. Yet, only 13% of the consumers stated that they buy all their food purchases as organic (Figure 6).

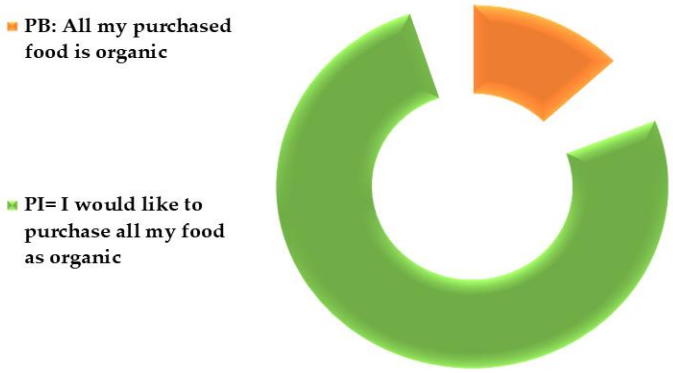

Figure 6. The percentage of consumers who held intentions to buy all their food as organic (PI: purchase intentions) versus the percentage of consumers who reported to purchase all their food as organic (PB: purchase behaviour).

Figure 7 illustrates the personal intention-behaviour gap where 77.5% of the consumers have a purchase behaviour less than their declared intentions, while 22.5% of the consumers purchase the same amount as they intend to do. The Wilcoxon signed-rank test found a significant difference ($p < 0.01$) between consumers' intention to buy organic food and their real purchase behaviour.

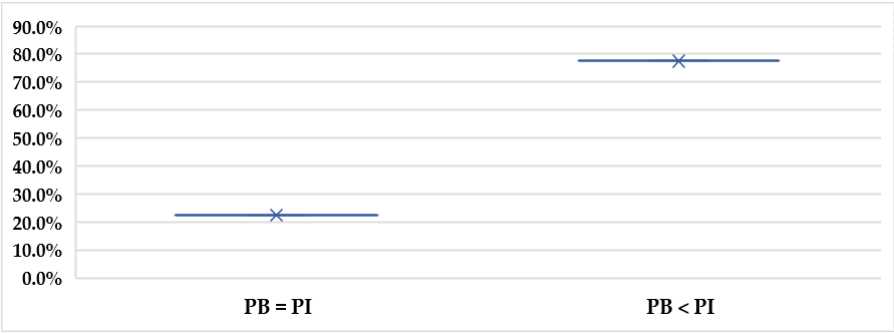

Figure 7. The percentage of the consumers who hold purchase intentions (PI) equal to their purchase behaviour (PB), and consumers who hold PI higher than their PB.

No significant impact of purchase behaviour or purchase intention was found on the declared positive emotions towards organic and conventional food. On the other hand, results indicated that positive emotion attitudes towards organic and conventional food are not a significant predictor of neither organic food purchase intention nor behaviour.

The Mann–Whitney analysis showed no gender impact on the purchase behaviour or purchase intention ($p > 0.05$).

3.4.1. Perceived Impact of IBG on Subjective Well-Being

Seventy-five per cent of the consumers were satisfied with their general well-being state, half of this percentage believed that organic food consumption had the main impact on their good well-being state.

When consumers were asked about the perceived influence of the intention-behaviour gap in their organic food consumption on the subjective well-being, 22% agreed on the negative impact of IBG on their well-being state, while half of the consumers believed that the IBG had no influence on their well-being. In addition, all consumers who agreed on the impact of the organic behaviour on their good well-being had a high consumption behaviour (they purchase more than half of their food as organic).

3.5. Rapid Forced-Choice

In the rapid forced-choice test, the participants had 2 s to choose one of two orange juice bottles (organic and conventional) that were put in a closed box. Forty per cent of the participants chose the conventional orange juice bottle. Among the participants who had higher positive emotions towards organic orange juice bottle in the emotional profiling, 55% chose eventually the conventional juice bottle. Moreover, 57% of the participants who liked the organic juice bottle more than the conventional one chose the conventional juice bottle in rapid forced-choice test.

A generalized linear model was used to assess the degrees of impact of (i) overall liking, (ii) Eli.PE in the emotional profiling, (iii) Dec.PE in the cognitive survey, and (iv) purchase behaviour patterns on the final choice of organic versus conventional juice bottle.

Overall liking and Eli.PE towards organic juice bottle were poor yet significant predictors ($p < 0.1$) of the final choice for organic juice bottle under time pressure. The participants who showed higher positive emotion attitudes and had a stronger preference towards the organic juice bottle tended eventually to choose the conventional bottle.

On the other hand, Dec.PE towards conventional food in the cognitive survey was found as a significant good predictor of the final choice of conventional bottle in comparison with the organic one. The participants who declared more positive emotions towards conventional food in the cognitive survey tended to choose the conventional juice bottle at the end.

The study found that neither participants' reported intention nor behaviour patterns were significant predictors of their rapid choice of organic versus conventional juice bottle.

4. Discussion

To investigate the differences in people's emotion attitudes towards organic and conventional food/samples, this study applied three methods: a cognitive survey and an emotional profiling under two types of conditions: informed and uninformed conditions, with explicit and implicit measures. In this study, we differentiate between food-declared emotions that are declared in the cognitive survey and food-elicited emotions that are expressed in the emotional profiling.

Knowledge of organic food concept was an important aspect to be considered when recruiting consumers. Notwithstanding, recruiting consumers was random, 96% of the consumer sample had moderate to very good knowledge of organic food concept. This could be explained by the educational level the consumers had as most of the consumers were still students or held a university degree. An additional explanation could be the growing interest in the benefits of the organic produced food as well as people's increased concerns about health issues, environment, and other aspects related to the sustainability concept.

Taste, as mentioned in previous research [45,48], is considered one of the most important factors that influence organic consumption. In this study, consumers rated the factor "taste" as one of the first three factors behind their organic consumption. They believed that organic food has better taste than conventional food. Yet, consumers equally liked the taste of conventional samples as organic ones in the uninformed test, which is consistent with other works [49,50]. This shows how using a self-reported method to assess a certain sensory attribute of an organic product may result in an outcome that diverges from the outcome of a real consumption experience.

Moreover, consuming organic food since childhood had a relationship, yet not significant, with current organic purchase behaviour. This shows the important role of childhood food habits that influence the adult food behaviour [51].

4.1. Food-Declared Emotions vs. Food-Elicited Emotions

4.1.1. Organic versus Conventional

In the cognitive survey, consumers rated their positive food-declared emotions towards organic food significantly higher than the conventional food and declared significant higher negative emotions towards conventional than organic food. Likewise, the results of the informed emotional profiling of organic and conventional orange juice bottles were consistent with the cognitive survey. However, the results obtained from the uninformed emotional profiling were different. Neither explicit nor implicit measures detected any significant differences in food-elicited emotions between organic and conventional samples. This shows how consumers' emotional attitudes may change between informed and uninformed tests. The results also suggest that in a cognitive survey and an emotional profiling under informed condition, consumers would exaggerate their positive emotion attitudes towards organic over conventional food/samples, and their negative emotion attitudes towards conventional over organic food/samples. This exaggeration could be largely guided by the perceived credence attributes of organic over conventional food [48]. The word (or the label) "Organic/Bio" might have an impact on both declared and elicited emotion attitudes. These results were in line with previous studies that showed that once a product was labelled or referred to as organic it would trigger higher positive attitudes or willingness-to-pay for this product [18,48,52–56].

This could be explained due to the cognitive bias, which is a factor that affects people's judgment and interpretation of their attitudes. Throughout the years, the credence benefits of organic food were overstated by marketing strategies. The ongoing advertisements promote organic food as a credence product that holds advantages to the human health, animal welfare, and the environment. The emphasizing on the organic food advantages versus the disadvantages of the conventional food led the consumers to shape a stereotype of those two categories of products. Consumers in this study may have been affected by the mentioned stereotype, and thus made the assessment of their emotion attitudes towards organic and conventional food in the cognitive survey and the informed consumption experience based on the preconceived credence attributes they usually associate with organic food.

However, the focus of the market on organic as a credence attribute is still not enough to boost consumers' purchases behaviour and narrow the consumers' IBG that was demonstrated in this study.

4.1.2. Cognitive Survey versus Emotional Profiling

The results obtained from the comparison between the cognitive survey and the emotional profiling revealed two important points.

First, consumers would declare higher negative attitudes towards conventional food in a cognitive survey than their expressed attitudes in both informed and uninformed consumption experience. Our results confirm previous findings on how consumers may change their detected attitudes with different methods [2,33–35,57].

While consumers' Eli.PE towards conventional samples in the uninformed emotional profiling (taste and smell) were higher than their Dec.PE in the cognitive survey, their declared and elicited emotions were not significantly different between the cognitive survey and the informed emotional profiling (visual test). From these results, it is clear that consumers' positive emotion attitudes would be changed when they know for certain that they are testing a conventional sample against an organic one. This result ties well with previous studies [53,58] wherein consumers judged a product due to a preconceived notion or opinion even before testing it.

Secondly, people would overstate their positive emotion attitudes and they would understate their negative emotion attitudes towards organic food in a cognitive survey compared with a real consumption experience.

The different outcomes between the cognitive survey and the emotional profiling obtained in this study could have resulted from the sample types. Though, our study suggests taking into consideration the effect of the different experimental methods (self-reported method and emotional profiling in informed and uninformed conditions). The significant differences in attitudes, which

were evident when the label "Organic/Bio" was visible, may have resulted due to the different applied methods.

Table 5 demonstrates the strength of each method in predicting emotion attitudes towards organic and conventional food/samples. Each of the cognitive surveys, informed and uninformed emotional profiling represented good methods (+) of reporting the positive and negative emotion attitudes towards organic food/samples. Both the cognitive survey and informed emotional profiling were not strong methods (−) in reporting the positive or negative emotion attitudes towards conventional food. Consumers' declared attitudes were affected by the comparison between the organic and conventional food.

However, the uninformed method was considered the strongest (++) among the other methods in reporting positive and negative emotion attitudes towards organic and conventional samples as consumers were not influenced by the organic label impact. Thus, their attitudes were not based on the comparison between the nature of the samples (organic and conventional). Food-declared emotions in the cognitive survey towards organic food were not predictors (−) of the final choice of organic sample under time pressure. Moreover, Eli.PE and preferences in the emotional profiling towards organic were significant but negative predictors (− −) of the final choice of organic (see Section 3.5). On the other hand, declared emotion attitudes towards conventional food represented a significant predictor (++) of the final choice of the conventional sample.

Table 5. The strength of the different applied methods in predicting emotion attitudes and final choice behaviour of organic vs. conventional food or samples. (*) represents the significant results.

	Detect Real PEA towards Organic	Detect Real NEA towards Organic	Detect Real PEA towards Conventional	Detect Real NEA towards Conventional	Predict the Final Choice of Organic	Predict the Final Choice of Conventional
Cognitive survey	+	+	−	−	− − (*)	++ (*)
Emotional profiling (Informed condition)	+	+	−	−	− −	−
Emotional profiling (Uninformed condition)	++	++	++	++		

PEA: positive emotion attitude. NEA: negative emotion attitude.

The terms guilty and happy were the most associated emotion terms with the conventional concept by consumers in both the cognitive survey and informed emotional profiling. Similar findings related to the feeling of guilt were reported by previous studies [22,23]. These results go beyond previous reports, showing that the consumers also used the term "happy" to express their food-declared and food-elicited emotions towards conventional food or samples.

Besides focusing on the credence benefits of organic food, the organic marketing strategies is emphasizing the negative impacts of the conventional food production method on the different aspects of life. People would usually feel positive emotions when consuming food, yet their responsibilities towards their health, environment, and animal welfare would lead to mixing the feeling of pleasure to have food with the feeling of guilt to have conventional food in particular.

The present study confirmed the findings of the strong correlation between positive food-elicited emotions and overall liking [20]. Higher rates of positive emotions were accompanied by higher rates of overall liking for all samples and vice versa. For red bell pepper, the low rate of overall liking was consistent with lower rate of positive emotions.

4.1.3. Organic Food Concept: Cognitive Survey vs. Touch Test

The results from the touch test also showed the differences between the responses obtained from a cognitive survey and the responses obtained from a real touch experience. Health was perceived more related to organic concept than premium price in the cognitive survey, while in the touch, those

aspects were almost perceived the same. Yet, premium price and health aspects were rated higher in the cognitive survey than the touch test.

4.2. Intention-Behaviour Gap

An intention-behaviour gap appeared clearly among the consumers in their organic food purchases. Most of the consumers reported an organic purchase behaviour that is less than their intentions. Nonetheless, some consumers are quite satisfied with their organic consumption pattern, and their behaviour meets their intentions. Reasons behind this gap were not discussed in this study, as it is planned to be discussed in further related work. However, according to previous research, price is the major barrier behind the intention-behaviour gap [3].

Similar to the results that were found in the rapid forced-choice test on the impact of consumers' Dec.PE on their organic choice in the lab, Dec.PE towards organic samples were not significant predictors of their daily life organic food purchase patterns. Besides, the reported purchase intentions and behaviour had no relationship with the declared organic emotion attitudes. Nevertheless, data showed that the higher positive attitudes consumers hold towards organic food, the more they buy or wish to buy. Additionally, the study found that neither gender nor time of starting organic consumption had a significant influence on consumers' organic purchase behaviour. This suggests that daily life purchasing of organic food could be subject to other factors than the ones that were studied in this work.

4.3. Rapid Forced-Choice

This research intended to use the time pressure condition combined with forced-choice to reduce the conscious impact on the preferred choice and avoid deliberate decision [34,59].

In the rapid forced-choice test, participants had to rapidly choose one of two orange juice bottles (organic and conventional). The two bottles differed in shape and materials and were similar in size and colour. The label ''Bio'' was distinct and readable on the organic juice bottle.

As mentioned before, participants were not informed at any point during the experiment about the content of the box in the rapid test. Yet, during the informed emotional profiling that preceded the rapid test, participants had enough time to check both bottles, discern the organic from the conventional one, and evaluate their implicit and explicit emotions with overall liking towards each bottle.

Under time pressure, nearly half of the participants were more likely to choose the conventional juice bottle. Over half of the participants who had higher preference and higher positive attitudes towards the organic juice bottle in the emotional profiling tended to choose the conventional bottle eventually.

Positive declared emotion attitudes in the cognitive survey form a good predictor of the final choice of conventional bottle, while they did not represent a good predictor of organic final choice. Our study suggests that the likelihood that consumers will choose a conventional orange juice bottle over the organic one under time pressure could be predicted by their positive emotion attitudes towards conventional in a self-reported method. However, the consumers' choice of the organic bottle under time pressure was unable to be predicted by any of the factors related to the participants' preferences, declared emotions, elicited emotions as well as their daily lives purchase intentions and behaviour.

It was proven that people's behaviour under time pressure is intuitive, guided by their underlying implicit attitudes. Time pressure bounds the information processing and decreases the influence of personal preferences on the final choice [34,39,40,59]. This suggests that the consumers' underlying choice of the conventional juice bottle over the organic one was led by one or more of different implicit factors such as the trade-off between organic and conventional products in everyday life like price and availability, or simply the material, shape, or position of the bottle inside the box.

Regardless of the position inside the box, all the other factors that have driven the participants to choose the conventional juice bottle over the organic one are considered as advantages in favour of the conventional juice.

In other words, whatever the factor that drove the participants rapid choice, this final choice reflects the perceived advantages of the conventional juice over the organic one. These advantages may have led to an underlying preference of the conventional juice, notwithstanding the participants' high declared positive emotions and overall liking for the organic juice vs. the conventional juice. This may have an implication in real life shopping at the supermarket as consumers sometimes try to reduce the time spent on grocery food, and thus do the shopping in some cases under time pressure.

4.4. Limitations of the Study

The findings of this study should be considered in light of some limitations. First, the data of the cognitive survey was obtained from a small sample size. Besides, the majority of the consumers were students, the thing that makes the sample lack population representativeness. Thus, the results cannot be generalized. However, this research study was the first, to our best knowledge, to investigate the differences in consumers' emotion attitude towards organic and conventional food applying three methods. The focus was to understand which method is able to detect the best consumers' real emotion attitudes.

It is advisable to do this comparison study of the three applied methods (informed and uniformed emotional profiling and the cognitive survey) with a larger sample size in order to investigate more predictors of the consumers' underlying preferences and investigate the impact of the different segments (e.g. occupation, education, and age) of consumers on their real emotion attitudes towards organic vs. conventional food or sample.

The "Bio" label that refers to the organic nature of the pear sample was not evident on the fruit throughout the experiment. Most of the consumers were not able to differentiate between the organic and the conventional fruit. This led to having the same results of overall liking and general emotions for both fruits, which was similar to the other samples from the uniformed tests. Thus, the informed emotional profiling was considered to be conducted with only one pair of samples. In addition, the rapid forced-choice test was also carried out with only one pair of samples. More samples are recommended to be used in both tests.

Despite this limitation, the results of this study have an important implication for future research efforts. The results may suggest that self-reported methods and informed emotional profiling are not the perfect methods to measure the real emotion attitudes for organic vs. conventional food.

5. Conclusions

No matter how consumers in this study expressed higher negative emotion attitudes towards conventional than organic food in the cognitive survey, they would still rate their emotions towards conventional food almost equally to organic food, or maybe higher, in a food consumption experience.

This paper argued that cognitive (self-reported) methods are not a good representation of real emotion attitudes towards organic versus conventional food. Consumers tended to appear as holding more positive emotions towards organic food and more negative emotions towards conventional food in the self-reported method. However, in the emotional profiling, which assimilates a real food consumption, consumers seemed not to have any different emotion attitudes for organic and conventional food.

Moreover, when consumers declared positive emotions towards conventional food in the cognitive survey, this declaration could predict their final behaviour of conventional food choice in the presence of organic choice under time pressure. Yet, this did not apply to the organic sample.

On the other hand, when consumers underwent a situation where they had to express their attitudes towards organic versus conventional samples, neither their implicit nor explicit emotions together with preferences would perform as good predictors of their final choice of organic vs. conventional sample. Apparently, consumers were affected by the "Organic/Bio" label and tended to overstate their overall linking and positive emotion attitudes towards organic over conventional sample, which might have resulted into a misinterpretation of the final choice between organic and conventional sample under time pressure.

In summary, this study detected a yawning gap in people's emotion attitudes between cognitive survey and food consumption experience under informed and uninformed conditions. This gap is considered a disadvantage in organic food marketing as it may lead to misunderstanding the consumer behaviour.

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Appendix A

The Colour Scale

The Served Samples in the Emotional Profiling (Taste Test)



The Served Samples in the Emotional Profiling (Smell Test)



The Served Samples in the Emotional Profiling (Visual Test)

Appendix B

Table 6. Means and significant values of Food-elicited emotion, Food declared emotions, overall liking, dwell time on the colour scale.

Sample	Type of samples	PE	P value Or-Co	NE	P value Or-Co	P value PE-NE	Overall liking	P value Or-Co	Dwell time LC	P value Or-Co	Dwell time DC	P value Or-Co	P value LC-DC
Apple	Or	2.70	.456	1.20	.789	.000	3.54	.228	3886.80	.324	1367.89	.324	.014
	Co	2.80		1.20		.000	3.77		4383.20		827.66		.000
Orange	Or	2.75	.590	1.42	.203	.000	3.79	.795	3517.56	.665	520.60	.168	.000
	Co	2.64		1.39		.000	3.87		3302.96		777.00		.000
Walnut	Or	2.11	.082	1.19	.084	.000	3.38	.309	2032.90	.019	2327.04	.004	.548
	Co	2.40		1.09		.000	3.62		2853.31		1339.43		.025
Oregano	Or	2.60	.027	1.40	.000	.000	3.79	.562	2825.56	.77	1348.09	.55	001
	Co	2.34		1.78		.000	3.72		2824.23		1343.61		.03
Red pepper	Or	1.93	.380	1.32	.993	.003	2.82	.411	3016.57	.460	1344.77	.827	.006
	Co	1.82		1.32		.008	2.67		2658.45		1143.61		.005
Coffee	Or	2.50	.900	1.29	.756	.000	3.67	.106	2363.26	.301	1951.30	.655	.3
	Co	2.51		1.27		.000	3.38		1898.78		2145.97		.63
Orange juice	Or	2.33	.018	1.34	. 029	.000	3.8	.000	3536.48	.076	368.23	.002	.000
	Co	1.88		1.68		.368	2.41		2746.32		1359.26		.058
Pear	Or	2.15	.058	1.20	.253	.000	3.5	.970	3486.41	.002	609.91	.102	.000
	Co	1.93		1.30		.002	3.6		2717.76		873.08		.000
Cognitive survey	Or	3.45	.000	1.18	.000	.000							
	Co	1.96		2.18		.406							

PE: positive emotions, NE: negative emotions, Or: organic sample, Co: conventional sample, LC: light colours, DC: dark colours.

References

1. Carrington, M.J.; Neville, B.A.; Whitwell, G.J. Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *J. Bus. Ethics* 2010, *97*, 139–158. [CrossRef]
2. Beattie, G.; McGuire, L. See no evil? Only implicit attitudes predict unconscious eye movements towards images of climate change. *Semiotica* 2012, *2012*, 315–339. [CrossRef]
3. Aschemann-Witzel, J.; Zielke, S. Can't Buy Me Green? A Review of Consumer Perceptions of and Behaviour Toward the Price of Organic Food. *J. Consum. Aff.* 2017, *51*, 211–251. [CrossRef]
4. Darby, M.R.; Karni, E. Free Competition and the Optimal Amount of Fraud. *J. Law Econ.* 1973, *16*, 67–88. [CrossRef]
5. Millock, K.; Hansen, L.G. Willingness to Pay for Organic Foods: A Comparison between Survey Data and Panel Data from Denmark. In Proceedings of the 12th Annual EAERE (European Association of Environmental and Resource Economists) Conference, Monterey, CA, USA, 24–27 June 2002.
6. Aertsens, J.; Verbeke, W.; Mondelaers, K.; Van Huylenbroeck, G. Personal determinants of organic food consumption: A review. *Br. Food J.* 2009, *111*, 1140–1167. [CrossRef]
7. Terlau, W.; Hirsch, D. Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon-Causes and Measurements towards a Sustainable Development. *Int. J. Food Syst. Dyn.* 2015, *6*, 159–174.
8. Vermeir, I.; Verbeke, W. Sustainable food consumption: Exploring the consumer "attitude-behavioural intention" gap. *J. Agric. Environ. Ethics* 2006, *19*, 169–194. [CrossRef]
9. Hashmi, U.; Huong, N.T.; Wee, C.S. Key Factors Affecting Consumer Purchase Intention a Study of Safe
10. Vegetable in Ho Chi Minh City, Vietnam. *Univ. Econ. Ho Chi Minh City Int. Sch. Bus.* 2012, *1*, 1–68.
11. Schleenbecker, R.; Hamm, U. Consumers' perception of organic product characteristics. A review. *Appetite* 2013, *71*, 420–429. [CrossRef]
12. Aschemann-Witzel, J.; Niebuhr Aagaard, E.M. Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and in-store food choice. *Int. J. Consum. Stud.* 2014, *38*, 550–558. [CrossRef]
13. Thøgersen, J.; de Barcellos, M.D.; Perin, M.G.; Zhou, Y. Consumer buying motives and attitudes towards organic food in two emerging markets: China and Brazil. *Int. Mark. Rev.* 2015, *32*, 389–413. [CrossRef]
14. Cardello, A.V.; Meiselman, H.L.; Schutz, H.G.; Craig, C.; Given, Z.; Lesher, L.L.; Eicher, S. Measuring emotional responses to foods and food names using questionnaires. *Food Qual. Prefer.* 2012, *24*, 243–250. [CrossRef]
15. Gutjar, S.; Dalenberg, J.R.; de Graaf, C.; de Wijk, R.A.; Palascha, A.; Renken, R.J.; Jager, G. What reported food-evoked emotions may add: A model to predict consumer food choice. *Food Qual. Prefer.* 2015, *45*, 140–148. [CrossRef]
16. King, S.C.; Meiselman, H.L. Development of a method to measure consumer emotions associated with foods. *Food Qual. Prefer.* 2010, *21*, 168–177. [CrossRef]
17. Ng, M.; Chaya, C.; Hort, J. Beyond liking: Comparing the measurement of emotional response using EsSense Profile and consumer defined check-all-that-apply methodologies. *Food Qual. Prefer.* 2013, *28*, 193–205. [CrossRef]
18. Spinelli, S.; Masi, C.; Dinnella, C.; Zoboli, G.P.; Monteleone, E. How does it make you feel? A new

approach to measuring emotions in food product experience. *Food Qual. Prefer.* 2014, *37*, 109–122. [CrossRef]
19. Thomson, D.M.H.; Crocker, C.; Marketo, C.G. Linking sensory characteristics to emotions: An example using dark chocolate. *Food Qual. Prefer.* 2010, *21*, 1117–1125. [CrossRef]
20. Schouteten, J.J.; de Steur, H.; de Pelsmaeker, S.; Lagast, S.; de Bourdeaudhuij, I.; Gellynck, X. Impact of health labels on flavor perception and emotional profiling: A consumer study on cheese. *Nutrients* 2015, *7*, 10251–10268. [CrossRef]
21. Mojet, J.; Dürrschmid, K.; Danner, L.; Jöchl, M.; Heiniö, R.L.; Holthuysen, N.; Köster, E. Are implicit emotion measurements evoked by food unrelated to liking? *Food Res. Int.* 2015, *76*, 224–232. [CrossRef]
22. Desmet, P.M.A.; Schifferstein, H.N.J. Sources of positive and negative emotions in food experience. *Appetite* 2008, *50*, 290–301. [CrossRef]
23. Wang, J.; Bao, J.; Wang, C.; Wu, L. The impact of different emotional appeals on the purchase intention for green products: The moderating effects of green involvement and Confucian cultures. *Sustain. Cities Soc.* 2017, *34*, 32–42. [CrossRef]
24. Antonetti, P.; Maklan, S. Feelings that Make a Difference: How Guilt and Pride Convince Consumers of the Effectiveness of Sustainable Consumption Choices. *J. Bus. Ethics* 2014, *124*, 117–134. [CrossRef]
25. Verhoef, P.C. Explaining purchases of organic meat by Dutch consumers. *Eur. Rev. Agric. Econ.* 2005, *32*, 245–267. [CrossRef]
26. Dean, M.; Raats, M.M.; Shepherd, R. Moral concerns and consumer choice of fresh and processed organic foods. *J. Appl. Soc. Psychol.* 2008, *38*, 2088–2107. [CrossRef]
27. Dalenberg, J.R.; Gutjar, S.; Ter Horst, G.J.; De Graaf, K.; Renken, R.J.; Jager, G. Evoked emotions predict food choice. *PLoS ONE* 2014, *9*, 1–16. [CrossRef]
28. King, S.C.; Meiselman, H.L.; Carr, B.T. Measuring emotions associated with foods in consumer testing. *Food Qual. Prefer.* 2010, *21*, 1114–1116. [CrossRef]
29. Meiselman, H.L. A review of the current state of emotion research in product development. *Food Res. Int.* 2015, *76*, 192–199. [CrossRef]
30. Desmet, P. Development and application of an instrument to measure emotional responses to products. In *Funology*; Springer: Dordrecht, The Netherlands, 2003; pp. 111–123.
31. Danner, L.; Sidorkina, L.; Joechl, M.; Duerrschmid, K. Make a face! Implicit and explicit measurement of facial expressions elicited by orange juices using face reading technology. *Food Qual. Prefer.* 2014, *32*, 167–172. [CrossRef]
32. De Houwer, J.; Moors, A. How to define and examine implicit processes? In *Psychology of Science: Implicit and Explicit Processes*; Proctor, R., Capaldi, E.J., Eds.; Oxford University Press: Oxford, UK, 2012; pp. 183–198.
33. Ismael, D.; Ploeger, A. Development of a Sensory Method to Detect Food-Elicited Emotions Using Emotion-Colour Association and Eye-Tracking. *Foods* 2019, *8*, 217. [CrossRef]
34. Beattie, G.; McGuire, L.; Sale, L. Do we actually look at the carbon footprint of a product in the initial few seconds? An experimental analysis of unconscious eye movements. *Int. J. Environ. Cult. Econ. Soc. Sustain.* 2010, *6*, 47–66.
35. Beattie, G.; Sale, L. Shopping to Save the Planet? Implicit Rather than Explicit Attitudes Predict Low Carbon Footprint Consumer Choice. *Int. J. Environ. Cult. Econ. Soc. Sustain. Annu. Rev.* 2011, *7*, 211–

232. [CrossRef]
36. Greenwald, A.G.; Nosek, B.A. Attitudinal Dissociation: What Does it Mean? In *Attitudes: Insights from the New Implicit Measures*; Psychology Press: London, UK, 2008; pp. 85–102.
37. Dane, E.; Pratt, M.G. Exploring Intuition and Its Role in Managerial Decision Making. *Source Acad. Manag. Rev. Acad. Manag. Rev.* 2007, *32*, 33–54. [CrossRef]
38. De Leeuw, E.D.; Hox, J.; Dillman, D. *International Handbook of Survey Methodology*; Routledge: Abington on the Thames, UK, 2008.
39. Tseng, K.C. Behavioural finance, bounded rationality, neuro-finance, and traditional finance. *Invest. Manag. Financ. Innov.* 2006, *3*, 7–18.
40. Koola, P.M.; Benjamin, P.; Schatz, S.; Colombo, G. A Methodology for Capturing and Fusing Unconscious Cognition with Computation. *Proced. Manuf.* 2015, *3*, 4129–4135. [CrossRef]
41. Kühn, S.; Brass, M. Retrospective construction of the judgement of free choice. *Conscious. Cognit.* 2009, *18*, 12–21. [CrossRef][PubMed]
42. UNI EN ISO 8589. *Sensory Analysis–General Guidance for the Design of Test Rooms*; International Organization for Standardization: Geneva, Switzerland, 2007.
43. Foti, D.; Hajcak, G.; Dien, J. Differentiating neural responses to emotional pictures: Evidence from temporal-spatial PCA. *Psychophysiology* 2009, *46*, 521–530. [CrossRef]
44. Xing, C.; Isaacowitz, D.M. Aiming at happiness: How motivation affects attention to and memory for emotional images. *Motiv. Emot.* 2006, *30*, 243–250. [CrossRef]
45. Bryła, P. Organic food consumption in Poland: Motives and barriers. *Appetite* 2016, *105*, 737–746. [CrossRef]
46. Gottschalk, I.; Leistner, T. Consumer reactions to the availability of organic food in discount supermarkets. *Int. J. Consum. Stud.* 2013, *37*, 136–142. [CrossRef]
47. Geier, U.; Hermann, I.; Mittag, K.; Buchecker, K. First steps in the development of a psychological test on the effects of food on mental well-being. *J. Sci. Food Agric.* 2012, *92*, 2753–2756. [CrossRef]
48. Simões-Wüst, A.P.; Moltó-Puigmartí, C.; Jansen, E.H.; van Dongen, M.C.; Dagnelie, P.C.; Thijs, C. Organic food consumption during pregnancy and its association with health-related characteristics: The KOALA Birth Cohort Study. *Public Health Nutr.* 2017, *20*, 2145–2156. [CrossRef] [PubMed]
49. Massey, M.; O'Cass, A.; Otahal, P. A meta-analytic study of the factors driving the purchase of organic food. *Appetite* 2018, *125*, 418–427. [CrossRef] [PubMed]
50. Bourn, D.; Prescott, J. A comparison of the nutritional value, sensory qualities, and food safety of organically and conventionally produced foods. *Crit. Rev. Food Sci. Nutr.* 2002, *42*, 1–34. [CrossRef] [PubMed]
51. Ellison, B.; Duff, B.R.L.; Wang, Z.; White, T.B. Putting the organic label in context: Examining the interactions between the organic label, product type, and retail outlet. *Food Qual. Prefer.* 2016, *49*, 140–150. [CrossRef]
52. Montaño, Z.; Smith, J.D.; Dishion, T.J.; Shaw, D.S.; Wilson, M.N. Longitudinal Relations Between Observed Parenting Behaviours and Dietary Quality of Meals from Ages 2 to 5. *Appetite* 2015, *87*, 324–329. [CrossRef] [PubMed]
53. Spinelli, S.; Masi, C.; Zoboli, G.P.; Prescott, J.; Monteleone, E. Emotional responses to branded and unbranded foods. *Food Qual. Prefer.* 2015, *42*, 1–11. [CrossRef]
54. Gmuer, A.; Nuessli Guth, J.; Runte, M.; Siegrist, M. From emotion to language: Application of a

systematic, linguistic-based approach to design a food-associated emotion lexicon German. *Food Qual.Prefer.* 2015, *40*, 77–86. [CrossRef]

55. Dentoni, D.; Tonsor, G.T.; Calantone, R.J.; Peterson, H.C. The Direct and Indirect Effect of 'Locally Grown' on Consumers' Attitudes towards Agri-Food Products. *Agric. Resour. Econ. Rev.* 2009, *38*, 384–396. [CrossRef]
56. Gao, Z.; Schroeder, T.C.; Yu, X. Consumer Willingness-to-Pay for Cue Attribute: The Value beyond its Own. *J. Int. Food Agribus. Mark.* 2010, *22*, 108–124. [CrossRef]
57. Rousseau, S. The role of organic and fair-trade labels when choosing chocolate. *Food Qual. Prefer.* 2015, *44*, 92–100. [CrossRef]
58. Schouteten, J.J.; De Steur, H.; Sas, B.; De Bourdeaudhuij, I.; Gellynck, X. The effect of the research setting on the emotional and sensory profiling under blind, expected, and informed conditions: A study on premium and private label yogurt products. *J. Dairy Sci.* 2017, *100*, 169–186. [CrossRef] [PubMed]
59. Weber, J.L. Analyzing the Correlation between Overall Likeness and Emotional Responses Before and After the Consumption of Dairy Beverages. Bachelor's Thesis, California Polytechnic State University, San Luis Obispo, CA, USA, 2012.

1. Friese, M.; Basel, M.W.; Plessner, H. Implicit Consumer Preferences and Their Influence on Product Choice. *Psychol. Mark.* 2017, *23*, 727–740. [CrossRef]

foods

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Article

Chapter 4: The Potential Influence of Organic Food Consumption and Intention-Behaviour Gap on Consumers' Subjective Wellbeing

Diana Ismael * and Angelika Ploeger

Specialized Partnerships in Sustainable Food Systems and Food Sovereignty, University of Kassel, 37213 Kassel, Germany; a.ploeger@uni-kassel.de

* Correspondence: diana.ismael@uni-kassel.de; Tel.: +49-561-804-1717; Fax: +49-561-804-1713

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Abstract: This paper applied a self-administered survey to investigate the impact of organic food behaviour and the intention-behaviour gap in organic food consumption (OIBG) on consumers' subjective wellbeing including physical, emotional, social and intellectual dimensions. The survey was carried out with 385 consumers. Furthermore, the study conducted a food test to explore the different impacts of organic and conventional food samples on the mental and physical conditions of consumers' wellbeing applying a psychological questionnaire. The food test took place in a sensory lab with a panel of 63 untrained German consumers. The research findings demonstrated a positive impact of the organic food consumption on consumers' subjective wellbeing, while no negative impact of OIBG has been perceived. Moreover, during the food test, consumers distinguished no differences between the impact of organic and conventional stimuli on their mental and physical status. Understanding how consumers perceive the impact of organic food consumption on their wellbeing is one important aspect. However, in the interest of narrowing the OIBG, it is more important to understand how consumers perceive the impact of this gap on their daily-life wellbeing.

Keywords: intention-behaviour gap; organic food consumption; subjective wellbeing; conventional food; food test; physical; emotional; social and intellectual dimensions; German consumers

1. Introduction

Wellbeing is considered a broad concept that involves a more holistic view of life. It is identified to be a multidimensional concept that is based on several interconnected dimensions [1,2]. This multidimensional nature of wellbeing has been addressed earlier by Hettler [3] and Roscoe [4], who have classified six interdependent dimensions for wellbeing: physical, emotional, social, intellectual, occupational and spiritual. As the food is well-known to have a great influence on our health, mood and emotions as well as our satisfaction with life, it is seen to have a strong impact on subjective wellbeing [5–9]. It is noticeable in the literature that a wide range of definitions of food-related wellbeing is emerging. For instance, Block et al. [10] defined food-related wellbeing as "a positive psychological, physical, emotional, and social relationship with food at both individual and societal levels." Recent food studies explained that food-related wellbeing is mainly based on four common dimensions represented by the physical, intellectual, emotional and social dimensions, in addition to overall satisfaction with life [2,4,7,8,11,12].

Consumers' perception of food-related wellbeing can have a bigger effect on their food habits and may help to address a more holistic assessment of a food product than overall liking, health or environmental concerns. Accordingly, subjective wellbeing has become a major focus in food marketing, sensory and consumer research. Researchers have become more concerned about the effect of food intake on subjective wellbeing [6,10]. According to Diener and Rayan [13], a better

understanding of how to improve subjective wellbeing in the food context can provide opportunities to promote a higher quality of food lifestyle and help to develop successful food policies.

Organic food is highly related to the concept of subjective wellbeing as it is proven to be associated with health, emotions and social wellness [5,14–25]. Health is seen as the leading factor behind green choices [26] and one of the factors that give organic food an advantage over conventional food. However, current food manufacturers seek not only to market a "healthy product" but rather to provide consumers with food products that improve their wellbeing and make them feel better and satisfied [27,28].

As wellbeing is considered one of the most important aspects that people aim to achieve in their lives, understanding the association between subjective wellbeing and organic food can contribute to a better comprehension of the consumer's behaviour and final choice of organic food [29]. Investigating how organic food impacts consumers' health and emotions has been an interesting core for plenty of previous and current research. However, studying the effect of organic food on subjective wellbeing has been scarce comparing to health and emotional aspects [30,31]. Thus, a clearer understanding of this relationship is currently needed [29,32].

Moreover, research demonstrates that consumers usually express great enthusiastic attitudes towards organic food, though their actual buying behaviour falls short to these attitudes [33–39]. This disparity between their intentions to buy organic products and the relatively lower level of actual purchasing is acknowledged as the intention-behaviour gap in organic food consumption (OIBG). The organic food market is considered a strong representative of this gap. This gap has been previously attributed to different reasons such as high prices, limited availability, lack of trust or lack of knowledge [22,34,37,40]. The effect of the intention-behaviour gap on consumer's subjective wellbeing, including the physical, emotional, social and intellectual dimensions, as far as we are aware, has not been addressed in literature yet.

During the progress of developing wellbeing scales, studies have focused on the effects of specific food products [12] or food in general [41]. Nonetheless, few have looked at the effect of organic food in particular, and none, to the best of our knowledge, has considered consumers' perception of the effect of OIBG on their subjective wellbeing. Thus, this work imposes the questions of what is the potential influence of organic food consumption and, more importantly, the intention-behaviour gap on consumers' subjective wellbeing? How would OIBG make consumers feel in general and what are the barriers behind this gap from the consumers' perception?

Furthermore, in addition to applying self-administered questionnaires to measure how food influence the different dimensions of wellbeing [7,30,41,42], food tests were also conducted to explore consumers' mental and physical changes after food intake [43,44]. Geier et al. [43,44] developed a psychological questionnaire to observe the effect of food consumption on consumers' mental and psychological state related to their wellbeing status. Their work proved that untrained consumers can report mental and physical changes caused by distinct food types. Our study examines, based on Geier et al. test, whether consumers would feel any differences in their mental or physical states between organic and conventional food samples during a food test. This work is the first to focus on how organic and conventional food could differ in their effect on subjective wellbeing during a food consumption experience.

As wellbeing is a broad concept that combines health, emotions, social and other aspects of life, this work aims to understand how consumers perceive the effect of organic food consumption and mainly OIBG on some of these aspects related to their subjective wellbeing.

2. Materials and Methods

This study consisted of two between-subject design parts. The first part was a self-administered web-based survey conducted with 385 consumers, which is the optimal sample size needed for large populations with a margin of error of 5% and confidence level of 95% [45][204][204]. The second part was a food test that consisted of three groups of food-pairs conducted with 63 German consumers. Table 1 demonstrates the number, age and gender of the participants in each part of the study.

Table 1. Number, average age and gender percentage of the study sample.

Experiment	Number of Participants	Gender (%)		Average Age	Nationalities
Self-administered survey	385	Male	38%	48	• 200 German • 53 French • 56 Italian • 23 Spanish • 53 other nationalities
		Female	62%		
Food test	63	Male	40%	26	German
		Female	60%		

2.1. Self-Administered Survey

Consumers' perception of their subjective wellbeing associated with organic food consumption and OIBG was evaluated using a self-administered survey. The survey was distributed on a European level in English, German, French, Italian and Spanish language translated by academic native speakers. The survey was shared through social media, emails and personal invitations. It considered organic food consumption in general without focusing on a specific product as consumers of organic food may vary with their preferences.

The survey consisted of multiple items derived from previous studies [7,8,46–50]. Some minor adjustments had been made to fit the present study. To avoid the participant's boredom, some of the items were statements, others were questions. Table 2 shows the used items in the survey that was distributed throughout the universities' channel, social media, emails and personal connection.

Table 2. The items used in the self-administered survey to evaluate the effect of organic food and the intention-behaviour gap in organic food consumption (OIBG) on subjective wellbeing. Seven-point satisfaction scale (1: extremely dissatisfied, 4: neutral, 7: extremely satisfied) and seven-point agreement scale (1: strongly disagree, 4: neither agree nor disagree, 7: strongly agree) were applied.

Concept	Statement	Type of The Question
General introduction	Introduction statement to explain the general concept of wellbeing to make the participants familiar with the concept.	Statement
General satisfaction with life wellbeing	How much are you satisfied with your overall life wellbeing?	Seven-point satisfaction scale
Satisfaction with food-related life scale (SWFL) [1]	-I am generally pleased (satisfied) with my food-behaviour -My life is close to ideal regarding food and meals -Food and meals give me satisfaction in my daily life.	Seven-point agreement scale
Associations between organic food and subjective wellbeing	Write down the first three words that come to your mind when thinking about organic food and wellbeing.	Open-ended question
Organic food purchase frequency	How much organic food do you buy monthly? (please indicate the approximate percentage of organic purchases from your whole food purchases).	Open-ended question
The general effect of organic food on subjective wellbeing	Organic food has a good impact on my wellbeing	Seven-point agreement scale
	Subjective wellbeing dimensions [2]	
Physical dimension	-Consuming organic food has a good impact on my health -It helps me feel healthier	Seven-point agreement scale

Table 2 Cont.

Concept	Statement

Emotional dimension	-It makes me have positive emotions (e.g., proud, satisfied, happy) -It makes me feel good	Seven-point agreement scale
Social dimension	-It makes me feel more connected to surrounding people -It improves my self-image in front of others	Seven-point agreement scale
Intellectual dimension	-Consuming organic food helps me have a purposeful and meaningful life -It reflects more my self-knowledge and beliefs	Seven-point agreement scale
Drivers behind OIBG	What are the first three reasons that come to your mind when thinking about the gap between what you planned and what you purchased?	Open-ended question
The effect of OIBG on consumers' feelings and emotions	How does this gap make you feel?	Open-ended question
The effect of OIBG on consumers' subjective wellbeing	This gap has a negative impact on my wellbeing	Seven-point agreement scale
Physical dimension	-It makes me feel less healthy -It negatively influences my health	Seven-point agreement scale
Emotional dimension	-It makes me feel negative emotions (e.g., unsatisfied, sad, confused) -It makes me feel bad	Seven-point agreement scale
Social dimension	-It affects negatively my image in front of surrounding people -It makes me feel disconnected to the surrounding society	Seven-point agreement scale
Intellectual dimension	-It affects negatively my values in life -It influences badly my improvement in life	Seven-point agreement scale
Organic food purchase intention	If we supposed that all the obstacles you perceive to provoke the OIBG were overcome, how much organic food would you buy then? (please indicate the percentage from your whole monthly purchases)	Open-ended question

[1] Items were adapted from [45]. [2] Items were adapted from [7,9,46,49].

2.2. Food Test

According to Geier et al. [43], untrained consumers can detect changes in their mental and physical conditions consuming different types of food. The present study investigated the differences in the impact of organic and conventional food samples on consumers' wellbeing state during a food test.

This experiment took place in the sensory laboratory of Kassel University and Fulda University of Applied Science, Germany. The test was conducted with a panel of 63 untrained German consumers, which is compatible with the minimum number required of untrained panellists to obtain statistically reliable results according to ISO 11136 [51]. The experiment was carried out under the condition of German standard DIN 10974 [52].

Consumers volunteered to take part in the experiment. They were invited to participate and received information about the study's structure and general goals via emails, social media and personal invitations. Each participant was welcomed and had a quick chat with the experimenter to release any previous pressure or tension and to clarify the test design. During the test, participants used pre-prepared tablets to answer the questionnaire using RedJade software. The questionnaire was translated by an academic native speaker into the German language. After the test, all consumers received a small token of thanks (soft drink and flavoured yoghurt).

The experiment consists of six food tests with three groups of food stimuli. Each group consisted of a pair of samples, one organic and one conventional, Table 3. The food stimuli were chosen to be from different food categories (beverages, fruits of the same variety and bakery products), common among consumers, available in local supermarkets and with different sensory attributes. Samples that are known to have emotional effects such as coffee and chocolate were avoided.

The serving was carried out under-informed condition, a label of the organic product was displayed with the sample, in a monadic sequential design and identical conditions such as temperature (room temperature) and portion size. Stimuli groups were served in full randomization and the samples within each group were also served randomly.

Table 3. The product information on the six food stimuli.

Product Category	Product	Brand/Origin	Description
Beverage	Apple juice	Alnatura	Direct juice, red apples, cloudy juice, organically produced
		Tegut	Direct juice, red apples, cloudy juice, conventionally produced
Fruits	Fresh grapes	Origin: Italy	Organic seedless grapes
		Origin: Italy	Conventional seedless grapes
Bakery product	Spelt toast bread	Herzberger Bio-Bäckerei	Organic Dinkel wheat toast bread
		Golden toast	Conventional Dinkel wheat toast bread

As shown in Table 4, six wellbeing parameters were used as bipolar items to measure the food-related wellbeing status after testing each stimulus. Low values (close to one) represented a stronger connotation with the left term (e.g., light), and high values (close to five) represented a stronger connotation with the right term (e.g., heavy). These psychological parameters were adopted from a previous psychological test [43].

Table 4. The six bipolar items, rated on five points, that were used as the wellbeing parameters to measure consumers' food-related wellbeing.

When I Test This Sample	English		German	
my body feels	warm	cold	warm	kalt
	light	heavy	leicht	schwer
	bright	dark	hell	dunkel
I feel	alert	tired	erfrischt	müde
	energized	not energized	energetisiert	nicht energetisiert
my mood becomes	good	bad	Gut	schlecht

2.3. Data Analysis

RedJade sensory software was used to design the food test, randomize the serving and collect the data. Additionally, Statistical Package for Social Sciences (IBM SPSS Statistics version 24, Armonk, NY, USA) was used to conduct descriptive analysis, a Wilcoxon signed-rank test to compare the effect of organic with the conventional samples on each parameter, in addition to a Kruskal-Wallis test to investigate differences in satisfaction of life wellbeing between the categories of organic food buyers and a Mann-Whitney U test was conducted as a post hoc test.

For the open questions, terms were searched within each question, and words with similar meanings were grouped into categories and dimensions. The number of mentions for each word and category was counted regardless of whether the same respondent mentioned the same term more than once.

Median and Inter-Quartile Range (IQR) were calculated for satisfaction and agreement scales.

The responses scores of the satisfaction with food-related life scale (SWFL) were calculated. The score ranged from 3 (represents extreme dissatisfaction with food lifestyle) to 21 (extreme satisfaction with food lifestyle).

By measuring the purchase frequency, participants were categorized into three groups; regular buyer (consumers buy organic food more), irregular buyers (consumers buy organic and non-organic food equally) and casual buyers (consumers buy non-organic food more) based of the categorization used by Rana and Paul [5].

3. Results

3.1. Self-Administered Survey

3.1.1. Satisfaction with Life Wellbeing and Food-Related Behaviour

Wellbeing was introduced to participants as the concept of overall satisfaction with life, positive emotions and mood, good physical health and social state. When participants were asked about their general satisfaction with life wellbeing, they showed a good level of (Mdn = 5, IQR = 2) satisfaction with their life wellbeing (Table 5).

As Table 5 displays, consumers' satisfaction on their food lifestyle was also investigated using satisfaction with food-related life scale (SWFL). The score of food-related overall satisfaction ranged from 3 (totally not satisfied with their food lifestyle) to 21 (perfectly satisfied with their food lifestyle). The average general score of consumers' SWFL was 15. This value indicates that consumers have good satisfaction with their food behaviour.

The analysis showed a statistically significant relationship between life wellbeing satisfaction and the items of SWFL (p-value < 0.001).

Table 5. The median and Inter-Quartile Range (IQR) of consumers' overall satisfaction with life and satisfaction with food-related lifestyle (1 = strongly disagree, 7 = strongly agree) and (1 = strongly dissatisfied, 7 = strongly satisfied).

Concept	Median	IQR
Overall wellbeing satisfaction	5	2
Satisfaction with food-related life	5	2
	5	2
	6	2

Organic food purchase frequency was measured by asking consumers about the percentage of organic food purchases from the whole food purchases. By measuring organic purchase frequency, consumers were categorized into regular buyer (consumers buy more than 50% organic food), irregular buyers (consumers that buy organic and non-organic food equally) and casual buyers (consumers that seldom buy organic food) based on the categorization used by Rana and Paul [5].

As shown in Table 6, the group of casual buyers was the biggest representative group (65.71%) among other groups of consumers. Regular buyers represented approximately one-third of the sample size (29.32%) and the smallest group size in this study was irregular buyers.

Table 6. Percentage of consumers group based on their organic food purchase and organic food purchase intentions. The consumers were categorized into regular buyers who buy/intend to buy organic food more than other types of food, casual buyers who buy/intend to buy organic food less than other types of food and irregular buyers who buy/intend to buy organic food equally as other types of food.

The Group of Organic Food Buyers	% Out of the Study Sample (n = 385)	
	Purchase behaviour	Purchase intention
Regular	29.0%	75.8%
Irregular	5.5%	8.0%
Casual	65.5%	16.2%

A Kruskal-Wallis test was conducted to examine the differences in satisfaction with life wellbeing according to the types of organic food buyers. Significant differences (Chi-square = 8.34, p = 0.016, df = 2) were found among the three categories of organic buyers (regular, casual and irregular). As presented in Table 7, Mann-Whitney showed that regular buyers differed significantly from casual buyers with their overall satisfaction with life wellbeing. However, irregular buyers had no significant differences with regular nor casual buyers.

Table 7. Mann-Whitney analysis shows that the differences in satisfaction with life wellbeing between the different categories of organic food buyers. * Significance at $p < 0.05$.

Regular vs. Casual *		p	Regular vs. Irregular		p	Casual vs. Irregular		p
Mean rank (regular)	Mean rank (casual)	0.014 *	Mean rank (regular)	Mean rank (irregular)	0.374	Mean rank (casual)	Mean rank (irregular)	0.065
201.26	173.3		66.74	74.45		133.98	165.09	

3.1.2. How Consumers Associated Organic Food with Wellbeing Concept

When consumers were asked in the study to write the first three words that associate organic food with wellbeing concept from their perception, a total of 615 different individual words was reported. As individual words, "health" (163), "price" (45) and "sustainability" (39) were the most frequently mentioned words by consumers. All terms were grouped down into 36 categories (Appendix A), which finally were combined within five dimensions. As shown in Table 8, the food characteristics dimension was the most mentioned by consumers. The most salient individual words in food characteristics were "expensive," "sustainable" and "organic." Moreover, some foods, such as milk and eggs, represented the concept of wellbeing for some consumers.

The psychological dimension was also salient (22). Organic food and wellbeing were related together with positive emotions such as happiness, satisfaction and the feeling of responsibility.

Table 8. Frequency of mention of the five dimensions of organic food-related wellbeing and the most salient individual words when participants were asked to write down the first three words that come to their mind when thinking about organic food and subjective wellbeing.

Dimension	Individual Words	Number of Mentions
Characteristics of food	Intrinsic attributes: taste (tasty and not tasty), free of chemicals/poisons/toxins/pesticides, nutritious, GMO-free, green, fresh, delicious, natural Extrinsic attribute: expensive, sustainable, organic, label, safe, quality, clean, ethical, ecology, genuine, normal, brand (Demeter), good, eco-friendly, good for future, variety, diversity, great, transparent, real, new or fashion, cool, controlled, certified, trustful, good for animal welfare, bulk food, fair trade, food origin: regional/European/local/rural, harmful for the environment, untrustworthy, not sustainable	375
Physical health	Health, wellness, wellbeing	163
Specific food	Milk, eggs, salad, dry fruits, cucumber, apples, protein, meat, juice, peanut butter, organic fruits, vegetables, potatoes, tomatoes, onion	25
Psychological aspects	Happiness, satisfaction, invigorating, enjoyment, responsibility, positive feelings, emotionally balanced, pleasant, security, serenity, tranquillity	22
Personal attributes	Knowledge, awareness, education	17
	Life standards, organized life, long life, better life, accomplishments, lifestyle, childhood	8
	Less meat, no meat, vegetarian, vegan	5

3.1.3. The Impact of Organic Food Consumption on Subjective Wellbeing

Impact of organic food behaviour on consumers' subjective wellbeing has been studied applying items adopted from previously developed scales [7,8,46–50]. Four dimensions (physical, emotional, social and intellectual) were adapted from previous studies [7,9,46,49] and investigate in the present work. First, consumers were asked about their perception of the impact of consuming organic food on their subjective wellbeing. Most consumers indicated agreement with the idea that organic food consumption positively affects their subjective wellbeing in general (Mdn = 5, IQR = 2). Participants also believed that organic food affects their physical health and emotions more than their social life.

Among all items within the dimensions, the "it makes me feel healthier" item received the highest value (Mdn = 6, IQR = 3). Regarding the intellectual dimension, participants had a neutral agreement on the impact of organic food consumption on the intellectual aspect of their wellbeing. Table 9 demonstrates the median and IQR values of each item of the wellbeing dimensions.

Table 9. The median and IQR values of the nine items used to study organic food impact on subjective wellbeing (1 = strongly disagree, 7 = strongly agree).

Concept	Item	Median	IQR
The general effect of organic food on subjective wellbeing	Organic food has a positive impact on my wellbeing	5	2
Physical dimension	Consuming organic food has a good impact on my health	5	2
	It helps me feel healthier	6	3
Emotional dimension	It makes me have positive emotions (e.g., proud, satisfied, happy)	5	2
	It makes me feel good	5	2
Social dimension	It makes me feel more connected to surrounding people	5	2
	It improves my self-image in front of others	5	2
Intellectual dimension	Consuming organic food helps me have a purposeful and meaningful life	4	2
	It reflects more my self-knowledge and beliefs	4	3

3.1.4. The Intention-Behaviour Gap in Organic Food Purchase (OIBG)

OIBG in consumers' consumption was measured based on the disparity between the frequency of buying organic food in their daily life and the desired organic purchases in case of the absence of driver factors behind the gap. Eighty-six per cent of the participants stated that their organic food purchases would increase if the causes they reported (e.g., high price and lack of availability) would disappear.

Moreover, compared with the data demonstrated in Table 6, the percentage of regular buyers would increase from 29% to 76%, and the percentage of casual buyers would decrease from 66% into only 17% when the barriers behind the organic food purchase would disappear. This discrepancy between consumers daily behaviour and their intentions to purchase organic food represents their OIBG.

3.1.5. Consumers' Perception of the Reasons Behind OIBG

OIBG is one of the most important issues facing the organic food market. Narrowing this gap has been receiving growing attention by researchers recently. Participants were asked to think of the times when they go to the supermarket having the intention to purchase a specific amount of organic foods but ended up purchasing less than the intended amount. Then, they were asked to list three possible reasons behind the previous scenario. A total of 712 different individual words were reported. The individual words were categorized into 11 categories. As Table 10 shows, "financial concerns" led as the most associated factor to OIBG among all other categories (268). "Availability" was the second important reason that led to OIBG (173). Consumers expressed the lack of availability

using terms such as "limited choice," "less quantity" and "seasonality." Additionally, food characteristics (162), such as sensory attributes, quality, origin and packaging, were of the most related hinders behind OIBG. "Time pressure" during shopping was also one of the salient mentioned causes behind OIBG (31). Consumers' negative emotions towards organic products, such as disappointment and dissatisfaction, had a role to play at the marketplace (26). "Personal characteristic" (17) and "marketing strategies" (14) were mentioned almost equally as one of the obstructers of purchasing organic food.

Table 10. Frequency of mention of the most individual words and categories when participants were asked to write down the first three factors behind the intention-behaviour gap during their organic food purchase.

Category	Items	Number of Mention
Financial concerns	Expensive, insufficient cash, economic, financial aspects, limited budget, thrift, intention to save money	268
Availability	Little variety, lack of organic version, less quantity, little choice, seasonal products, scarcity, expiration date, lack of the wanted brand, lack of unpacked organic products, lack of presence, limited quantity	173
Food characteristics	In total	162
	Quality	47
	Origin (European, non-European, local, regional)	27
	Sensory attributes: unappetizing appearance, taste, flavour, unattractiveness	25
	Packaging (size, type of packaging such as plastic package, too much packaging)	18
	Information	15
	Not healthy	13
	Variety	8
	Convenience	8
	Utility	1
Time	Have no time, having no patience to search, unplanned purchase, impulsiveness, spontaneous buying decision, sudden hunger (so the purchase is done too fast), being in a hurry	31
Emotions	Disappointment, dissatisfaction, frustration, distrust, discomfort, cumbersome, nervousness, confusion	26
Personal characteristics	Lack of knowledge, mismanagement, forgetfulness, haste, laziness, inattentiveness, lack of self-control, inconsistency	22
Marketing	Promotion discount, advertising, location at the store, competition with other types of products	14
I do not know		7
Social effect	Roommates, consumers within the family, family habits, culture and believes	5
Food habits	Eating unhealthy, food habits	4

3.1.6. Impact of Intention-Behaviour Gap (OIBG) on Subjective Wellbeing

The intention-behaviour gap is a state where a gap between consumers' attitude and their behaviour occurs in the marketplace. As the subjective wellbeing concept covers various aspects of life, it is important to understand how it could be affected by such a gap.

Similar to the organic food consumption, OIBG impact on subjective wellbeing was investigated on a general level and four dimensions level (physical, emotional, social and intellectual). Consumers believed that the gap between their intentions to buy organic and their final purchase had no negative influence on their subjective wellbeing (Mdn = 4).

More than half of the participants (n = 385, 60%) expressed strong disagreement or disagreement on the negative impact of the OIBG on their wellbeing. As demonstrated in Table 11, the effect on the social dimension received the highest disagreement among other dimensions (Mdn = 3, IQR) = 3. The

impact of OIBG on physical and emotional dimensions was perceived almost equally where participants saw no influence of the OIBG on those two dimensions. Furthermore, participants indicated disagreement on how OIBG could affect their intellectual aspect in life.

Table 11. The median and IQR of the nine items that were used to study the impact of the intention–behaviour gap in organic food consumption (OIBG) on subjective wellbeing (1 = strongly disagree, 7 = strongly agree).

Concept	Items	Median	IQR
The general effect of OIBG subjective wellbeing	This gap has a negative impact on my wellbeing	4	
Physical dimension	It makes me feel less healthy	4	2
	It negatively influences my health	4	2
Emotional dimension	It makes me feel negative emotions (e.g., unsatisfied, sad, confused)	4	2
	It makes me feel bad	4	2
Social dimension	It affects negatively my image in front of surrounding people	3	3
	It makes me feel disconnected to the surrounding society	3	3
Intellectual dimension	It affects negatively my values in life	4	3
	It influences badly my improvement in life	4	3

3.1.7. The Effect of OIBG on Consumers' Emotions

The participants were asked about the effect of the gap between their intention and their behaviour to buy organic food on their emotions. A total of 616 words were mentioned, of which 44 were irrelevant answers such as "price and animal welfare," Table 12. Out of the 616 words, 455 were negative emotion words that were grouped into 49 different terms of which 35 were mentioned more than 2 times and 14 were mentioned only one time. The most salient way in which consumers expressed the OIBG influence on their emotional wellbeing was with the terms "dissatisfied" and "disappointed." Moreover, results showed that participants expressed positive emotions after OIBG with 81 positive words that were grouped into 14 different terms. Positive terms like "relieved, well, calm and relaxed" were grouped under the term "good." Moreover, the terms "content, delighted and cheerful" were counted under the term "happy." Participants declared a neutral effect of the OIBG on their emotional state using 80 words such as "normal" or statements such as "I don't know" and "I don't care."

3.2. Food Test

This study aims to understand the different effect of organic and conventional food on German consumers' subjective wellbeing parameters during a consumption experience.

Participants were asked to test two types of food samples; organically and conventionally produced. Then, participants were instructed to rate their body changes (response) after each type of the samples. The psychological test was previously verified as a suitable method for untrained consumers to recognize changes in their state of subjective wellbeing.

Participants used bipolar scales (warm-cold, light-heavy, bright–dark, alert–tired, energized–not energized, good mood–bad mood). As Table 13 shows organic and conventional stimuli differed neither in physical nor in mental effects in general. Results revealed no significant differences between the two types of samples in any of the six tested parameters except for the perception of brightness and mood for apple juice samples, where participants felt significantly brighter and were in a better mood (p-value < 0.05) after drinking the organic apple juice. Additionally, after testing the organic grapes sample, participants felt brighter (p-value < 0.05).

Although there were no apparent significant differences between organic and conventional stimuli, consumers tended to feel warmer, lighter, brighter, more energized, more alert and in a better mood, with small differences when testing organic apple juice and grapes samples comparing to the conventional samples.

Table 12. Frequency of mention of the emotion terms that were reported by the participants when they were asked to state the first three emotions that come to their mind when they think of how the intention-behaviour gap makes them feel.

Emotion Term	Number of Mentions	Emotion Term	Number of Mentions
Negative Emotions		Damaged	3
Dissatisfied	73	Confused	3
Disappointed	50	Unhealthy	3
Bad	45	Bored	2
Frustrated	23	Defeated	2
Guilty	20	Insecure	2
Sad	20	Neglected	2
Annoyed	14	Sorry	2
Other negative emotions [1]	14	Pretentious	2
Unhappy	12	Defeated	2
Poor	11	Undecisive	2
Restricted	11	Positive Emotions	
Worried	12	Good	34
Ashamed	9	Satisfied	10
Helpless	8	Healthy	11
Inconsistent	8	Motivated for next time	9
Uncomfortable	8	Great	4
Demotivated	7	Clean	2
Critical	7	Cool	2
Angry	6	Happy	7
Doubtful	4	Other positive emotions [2]	6
Nervous	4	Neutral	
Upset	4	Normal	60
Wrong	4	I don't know	12
Stingy	4	I don't care	8
Undisciplined	4	Irrelevant terms	44

[1] Other negative emotion terms: careless, lazy, weak, drained, disengaged, misled, hopeless, broke, anguished, fatigue, irritated, unforgiving, stupid, indecisive. [2] Other positive emotions: peace, interesting, balanced, positive, useful, proud.

Table 13. Mean values for each criterion of the bipolar scale of 1 (warm, light, bright, alert, energized, good mood) to 5 (cold, heavy, dark, tired, not energized, bad mood) for the three groups of samples (organic and conventional). Perc. stands for perception.

		Perc. of Warmth	Perc. of Lightness	Perc. of Brightness	Perc. of Alertness	Perc. of Energy	Mood
Spelt bread	Organic	2.74	2.98	2.94	3.12	3.27	3.04
	Conventional	2.90	2.99	2.79	3.02	3.42	2.97
Apple juice	Organic	2.84	2.34	2.04	1.97	2.06	1.94
	Conventional	3.10	2.36	2.28	2.22	2.31	2.28
Grapes	Organic	2.86	1.92	2.03	2.02	2.21	1.93
	Conventional	3.11	2.08	2.23	2.08	2.34	2.22

4. Discussion

Our work raised the question of which factors influence organic food consumption and how the intention-behaviour gap may influence consumers' subjective wellbeing. Furthermore, the work investigated the different effects of organic and conventional food stimuli on consumers' mental and physical parameters during a food test. Plenty of prior research studied health and wellbeing as motivational factors for consumers to purchase organic food. However, few works addressed the influence of organic food consumption on subjective wellbeing [30,31]. More importantly, the potential influence of the intention-behaviour gap in organic food consumption on wellbeing has not been explicitly proposed or previously studied.

4.1. Self-Administered Survey

After participants were introduced to the wellbeing concept, the majority were somehow satisfied with their overall life wellbeing. Much like their satisfaction with their life wellbeing, consumers showed similar satisfaction with their food lifestyle using satisfaction with food-related life scale (SWFL). Consumers were by some means satisfied with their food behaviour, which was consistent with results obtained by Grunert et al. [46]. This similarity between overall satisfaction with life wellbeing and SWFL could be linked to the significant relationship that was found between the SWFL items and the overall assessment of life wellbeing. This result highlights the importance of food as an essential part of people's lives. A persons' satisfaction on life wellbeing, according to the results, is related to the satisfaction with meals and food behaviour.

Moreover, the results found evidence for the relationship between satisfaction with life wellbeing and organic food behaviour as regular buyers of organic food felt more satisfied with their wellbeing comparing to casual buyers. This could imply the first hint of how organic food consumption patterns have a clear relationship with the way consumers assess their life wellbeing.

4.1.1. Consumers' Perception of the Association Between Wellbeing and Organic Food

In previous works, when people were asked about the association of food and wellbeing, many consumers mentioned the word "organic" [7,41]. In our work, we promoted participants to think about organic food and wellbeing. "Health" was the most relevant term mentioned by consumers when thinking of the association between organic food and subjective wellbeing. In previous findings "health" was the first-mentioned aspect to link food, in general, with wellbeing [7,12,53]. In our study, we also showed that consumers' conceptualization of wellbeing in an organic food-related context is strongly related to physical health. Thus, the present study confirms and adds to the previous findings on the association between organic food concept and "health" aspect. This result could be explained by the fact that "health," as previously addressed, is one of the most strongly correlated aspects with the concept of organic food [12,14,39,54].

However, consumers stressed on other dimensions such as "food characteristics," including intrinsic attributes such as "sensory attributes," "nutritional value" and "free of pesticides," and extrinsic attributes such as "price," which was the second most mentioned word after "health." This could be because consumers also link their food-related wellbeing with the economical aspect as explained by Ares et al. [7]. The fact that "food characteristic" was by far the most addressed dimension by consumers shows the importance of food attributes and organic concept to consumers concerning their wellbeing.

For some consumers, specific food (e.g., milk and eggs) also represented the relationship between organic food and subjective wellbeing which suggests the importance for those consumers to consume these specific products as organic to feel better wellbeing.

Previous works [7,66] showed that the psychological dimension is one of the most relevant dimensions in the relationship between food and wellbeing. Our results on organic food and wellbeing are consistent with the latter results. Consumers stressed positive emotions such as happiness, satisfaction and enjoyment to express their perception of organic food with regards to their subjective wellbeing. As many consumers usually show concerns about their health and feel responsible towards the environment and animal welfare, it is reasonable that consuming organic would provoke positive emotions within them feeling that they are doing good to those concerns.

4.1.2. The Impact of Organic Food Consumption on Subjective Wellbeing

We asked participants to declare their agreement on how organic food consumption affects the physical, emotional, social and intellectual aspects of their life wellbeing. Few previous works studied the general effect of organic food on wellbeing [30,31] and none of those works investigated the direct effect of organic food on different dimensions.

Consumers agreed on the general positive effect of organic food on their subjective wellbeing, which is consistent with what has been found in previous works [30,31]. Three dimensions of subjective wellbeing, emotional, physical and social dimensions were positively affected by organic food consumption. However, the intellectual dimension does not seem to be influenced by organic food consumption in the same manner as the other dimensions. Together, consumers believed that the consumption behaviour of organic food positively affects their subjective wellbeing and leads to better physical state, more positive emotions and better social life. These results could be applied to improve consumers' organic behaviour. Highlighting the fact that organic behaviour contributes to better personal wellbeing including not only physical but also emotional and social aspects of life would encourage consumers to consider adopting more organic food in their food lifestyle. More studies should emphasize the reward in subjective wellbeing that is related to organic food consumption to constitute a strong motive for consumers.

By showing that organic food consumption could positively impact subjective wellbeing, our work contributes to the growing global stream of studies that tackle the relationship between consumers' subjective wellbeing and organic food consumption.

4.1.3. The Intention-Behaviour Gap in Organic Food Purchase

Although consumers may express high positive attitudes towards organic food, the organic food market is still suffering from the so-call intention-behaviour gap phenomena (OIBG) [24,38,40,55–57].

As shown in our results, consumers' purchase behaviour falls short to their purchase intentions to buy organic food. This disparity is one of the real problems that are facing new calls to adopt a more sustainable lifestyle.

Consumers were asked to list three possible barriers behind the gap in their organic food purchase. It was not surprising that consumers considered by far the "financial concerns" as the first hindrance to purchasing more organic food. Specifically, consumers mentioned in addition to "expensive price" the terms "insufficient budget" and "intention to save money" preventing them from buying more expensive food. This could be strongly related to the financial status of the consumers [33,58], or it could be explained by the perception of consumers about the organic product

itself. Despite its important credence values, consumers' may perceive the organic product, as mentioned by part of the study sample, as an "unhealthy" "untrustworthy" product that does not deserve such a premium price.

Lack of availability was the second barrier in the list, as organic food has little variety or limited choices or closer expiration date comparing to other types of products. Those results are in line with the results obtained in previous studies [22,34,37,40]. Lack of availability reflects the market failure to provide organic consumers with their needs of products, which could be because this group of consumers is the least represented group in a specific market. Additionally, the lack of availability could be related somehow to high prices. If the group size of organic consumers is small in a specific market and the prices of organic products are high, which will discourage new consumers to join this group, producers and retailers would not be encouraged to supply the market with less-demanded food. Thus, the price is considered as the major reason behind OIBG.

Food characteristics also affected the final behaviour of consumers. In particular, participants stressed the aspect of product quality and sensory attributes. Consumers declared that they perceive organic products as less attractive and with less quality comparing to the same products from other types.

Some participants perceived organic as unhealthy as other products, which highlights the lack of trust in the "Bio" (Organic) label and eliminates the most driven factor behind organic behaviour, the "health" factor. Undeniably, the scientific significant health differences between organic diet and diets of other food types are still scarce. There has not been yet rigorous evidence that addresses the effects of organic versus conventional food on human health [59]. More studies are required to confirm or deny the validity of this belief. However, even if the motivation to buy organic came only from a psychological effect of the label, the adoption of a healthier and more sustainable lifestyle due to this effect should be still welcomed.

One notable reason for which consumers addressed was the "packaging" of the organic product. Consumers objected on the fact that organic product package may be in most cases not appropriate whether due to the package type (such as using plastic) or quantity and size (too much packaging). These results, in addition to other mentioned factors, are highly important to be taken into consideration by the organic marketers, as it tackles the search attributes that constitute the first line of the consumers' final decision alongside the experience attributes and credence attributes of organic products. Moreover, this result could be useful for organic food marketers who mostly focus on the factors that strengthen the OIBG to avoid them for the sake of narrowing this gap.

Another noteworthy barrier, of which consumers believed that it affects their purchase behaviour, is the "time" factor. Many consumers reported that they "don't have time" during shopping whether due to the "unplanned purchase" or "lack of patience" to search and compare. Organic products are usually not visible on the shelves, and a large number of consumers see themselves forced to pay extra attention and make more efforts to find their needs [38,60]. Thus, consumers "in a hurry" try to avoid such an extra effort. Most of the research on OIBG attribute the gap to different factors such as price, availability, the lack of trust, the lack of knowledge, habits and overall liking [33,37,40,61,62]. However, time pressure as an influent factor in OIBG is less infrequently discussed. Time pressure is widely investigated by researchers as an important factor that influences consumers' decision within the store [63–65]. It was concluded that time availability affects purchase behaviour at the marketplace [66]. It seems that consumers try to reduce the time spent on grocery shopping, which takes less time today available for them at the supermarket. Moreover, it was proven in previous works that under time pressure, people's behaviour becomes intuitive [19,67–69] and they rely on their implicit attitudes [23]. This could explain why consumers, under time pressure, may tend to choose the product they are familiar with, which in most cases is the most visible product with better price, availability, quality and sensory attributes. Furthermore, consumers referred to the marketing strategies, which also could be related to the "time" barrier. Marketing strategies of organic products should be larger and stronger, the public should be

informed more about the selling locations of organic food and organic products must be more visible and displayed in better locations inside the supermarkets (e.g., setting up bigger signs throughout and providing better places on the shelves). These steps could make the organic product more visible and more accessible to consumers even under time pressure.

Another barrier that was also salient, although it was mentioned in a lower frequency, is consumers' emotions towards the product in the marketplace. Emotional aspect played a major rule in consumers' final decision, which is consistent with previous results [7,70]. Participants declared that when they feel dissatisfied or disappointed towards the organic product, they tend not to buy it as planned. Those emotions could be driven by the search attributes of the product such as sensory attributes, the experience attributes such as a previous unpleasant experience that resulted from a bad taste or lack of trust with the credence attribute, e.g., when participants do not trust health advantages or other promoted benefits of the organic product.

4.1.4. Impact of Intention-Behaviour Gap (OIBG) on Subjective Wellbeing

Our work, to the best of our knowledge, is the first to cast a new light on the influence of OIBG on consumers' subjective wellbeing considering the physical, emotional, social and intellectual aspects of their lives.

Results showed that consumers did not seem to believe that OIBG negatively impacts their wellbeing. A previous study has addressed one statement on OIBG and wellbeing. Our result concerning this statement is in line with the result obtained by this work [23]. What distinguishes the present study is that it investigated the impact of the OIBG on different dimensions of wellbeing so it can form broader comprehension of this impact. This work demonstrated that even on the dimension levels, consumers did not perceive any negative impact for OIBG on their wellbeing dimensions. Although consumers usually link organic food consumption with better health and emotions, when it comes to consuming less organic food or more conventional food, they did not perceive any negative effect for such behaviour. Moreover, from consumers' perception, OIBG does not seem to impact any of the social or intellectual aspects of their life. This has not been validated yet in organic food studies.

This is an important finding in the understanding of consumers' perception of how the gap in their organic food behaviour affects their life wellbeing. As consumers declared that consuming organic food enhanced their wellbeing, including physical, emotional and social aspects, we expected that they would perceive a negative impact of consuming less organic food than what was intended to for their wellbeing. If consumers did not believe that OIBG has any effect on their wellbeing, this may raise concerns about how to motivate consumers to narrow this gap. Alongside emphasizing the positive impact on subjective wellbeing, it is rather important to be aware of how consumers look at the effect of OIBG leaves in their lives.

4.1.5. The Effect of OIBG on Consumers Emotions

The study explored the direct emotional impact of OIBG on consumers. When participants were asked using simple statements to declare their agreement on whether OIBG provokes negative emotions (It makes me feel negative emotions (e.g., unsatisfied, sad, confused) or It makes me feel bad), they declared a neutral agreement. However, when they were guided to imagine the scenario of the OIBG, they declared plenty of negative and positive emotion terms. Dissatisfied, disappointed and bad were the top provoked negative emotions by the OIBG scenario. These results show the importance of the type of questions that must be used to obtain a more comprehensive understanding of how OIBG affects consumers' emotions. Moreover, some of the participants declared, with far less frequency, positive emotion such as good, well and relaxed. Having positive emotions towards OIBG could be a bad sign of the effort towards narrowing the gap. It is important to emphasize the provoked negative emotions to motivate consumers to be more aware of the negative impact of OIBG on this important aspect of their wellbeing.

4.2. Food Test

This study tried to investigate any differences between the effect of organic vs. conventional food samples on German consumers' mental and physical wellbeing during a food test. Three groups of food stimuli (fruit, baked food and beverage), organic and conventionally grown, were used in this study. A pre-developed psychological questionnaire [43], which includes physical and mental parameters, was applied to detect the changes in consumers' wellbeing state during food consuming experience.

Results showed that German consumers identified no significant difference between the impact of organic vs. conventional food stimuli on their subjective wellbeing parameters. Although in most cases consumers felt warmer, lighter, brighter, more alert, with more energy and in a better mood when eating organic samples, those differences between organic and conventional were very small and difficult to observe. This is in line with the results obtained by Geier et al. [43] when they used organic and conventional produced samples among other varieties of samples in their approach.

Regarding the so-called "label effect," in previous work consumers declared the same emotional attitudes towards organic and conventional food samples in a blind test. Yet, in an informed test, significant differences were found between the two types of samples due to a "label effect" [23]. On the contrary, it is notable that consumers in this study were not influenced by the label as they stated their perceived effect of organic food on their mental and physical wellbeing in the same way as the conventional samples. The results demonstrated that being affected by the label effect of organic is not necessarily true in all comparisons between organic and conventional food tests. This could be explained in part by the experiment procedures. When conducting the test, the experimenter emphasized for each participant the importance of focusing only on their body changes. Thus, we speculate that according to the experimenter instructions, participants focused on their mental and physical body changes more than concentrating on the label. This may be the reason why we did not find an impact of the label effect.

From this standpoint, organic food intake can be considered to have the same effect on consumers' mental and physical parameters as conventional food intake. Thus, at this stage of understanding, we believe that organic food marketers should focus more on the credence attributes of organic food-related to physical, emotional, social and other benefits (e.g., environment and animal welfare) obtained from organic consumption behaviour more than focusing on the comparison with other types of food with regards to experience attributes.

5. Conclusions

We showed how the term "health" is the strongest term that associates organic food with the wellbeing concept, and the term "price" is the major barrier behind OIBG. Moreover, consumers in this study agreed that organic food consumption provides them with better wellbeing, including physical, emotional and social aspects. However, they did not believe that the gap between their intentions to buy organic food and their real behaviour in the marketplace had any influence neither on their life wellbeing nor on the physical, emotional, social or intellectual aspects.

Furthermore, for German consumers, organic and conventional food samples during a food consumption experience had similar effects on their mental and physical wellbeing parameters of the body.

In brief, as wellbeing is a broad concept involves not only personal health but rather emotions, social and intellectual aspect of a person's life, an important implication of this study is to boost organic food behaviour by emphasizing its positive impact on subjective wellbeing; additionally, to be aware of how consumers perceive the effect of OIBG on their wellbeing. The results would impact positively organic food marketing and enhance the promotion of organic food behaviour.

6. Limitations

The intention–behaviour gap was reported in almost all European markets. The cultural effect is reported to have an impact on consumers' perception, behaviour and final choice. As the number

of the sample size of different EU nationalities (and their food cultures) in this study is small and not statistically representative of the population, results must be considered as preliminary ones. Thus, a study that investigates the cultural impact on the consumers' perception of the effect of OIBG on their wellbeing with a higher statistically representative sample is highly recommended.

Moreover, the demographic characteristics of consumers including occupation, education and income were not collected. Investigating the impact of the income, education and occupation on consumers' perception is considered important. Moreover, studying differences between consumers' groups based on these characteristics is also considered important. Further studies that focus on the cultural effect and involve demographic characteristics are required in the future.

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Appendix A

Table A1. Frequency of mention of the 36 categories of organic food-related wellbeing and the most salient individual words when participants were asked to write down the first three words that come to their mind when thinking about organic food and subjective wellbeing.

Category	Number of Mentions
Health	163
Price	45
Sustainability	39
Organic	38
Pesticide-free	35
Eco-friendly	31
Natural	25
Specific food	25
Positive emotions	22
Good	21
Knowledge	17
Better	14
Quality	13
Green	10
Safe	10
Others	10
Trust	9
Certificate	7
Clean	7
Fresh	7
Tasty	7
Animal welfare	7
Nutritious	6
Bad	6
Lifestyle	6
Untrustworthy	6
Food diet	5
Fair	5
Ethical	4
Region	4
Genuine	3
Normal	2
Ecology	2
Childhood	2
GMO-free	1
Brand	1

References

1. Dodge, R.; Daly, A.; Huyton, J.; Sanders, L. The challenge of defining wellbeing. *Int. J. Wellbeing* 2013, *2*, 222–235. [CrossRef]
2. Diener, E.; Oishi, S.; Lucas, R.E. Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. *Annu. Rev. Psychol.* 2003, *54*, 403–425. [CrossRef] [PubMed]
3. Hettler, B. Wellness: Encouraging a lifetime pursuit of excellence. *Health Values* 1984, *8*, 13–17. [PubMed]
4. Roscoe, L.J. Wellness: A review of theory and measurement for counselors. *J. Couns. Dev.* 2009, *87*, 216–226. [CrossRef]

5. Rana, J.; Paul, J. Consumer behaviour and purchase intention for organic food: A review and research agenda. *J. Retail. Consum. Serv.* 2017, *38*, 157–165. [CrossRef]
6. Bublitz, M.G.; Peracchio, L.A.; Andreasen, A.R.; Kees, J.; Kidwell, B.; Miller, E.G.; Motley, C.M.; Peter, P.C.; Rajagopal, P.; Scott, M.L.; et al. Promoting positive change: Advancing the food well-being paradigm. *J. Bus. Res.* 2013, *66*, 1211–1218. [CrossRef]
7. Ares, G.; de Saldamando, L.; Giménez, A.; Claret, A.; Cunha, L.M.; Guerrero, L.; de Moura, A.P.; Oliveira, D.C.R.; Symoneaux, R.; Deliza, R. Consumers' associations with wellbeing in a food-related context: A cross-cultural study. *Food Qual. Prefer.* 2015, *40*, 304–315. [CrossRef]
8. Ares, G.; De Saldamando, L.; Giménez, A.; Deliza, R. Food and wellbeing. Towards a consumer-based approach. *Appetite* 2014, *74*, 61–69. [CrossRef]
9. Schnettler, B.; Miranda, H.; Sepúlveda, J.; Denegri, M.; Mora, M.; Lobos, G.; Grunert, K.G. Psychometric properties of the satisfaction with food-related life scale: Application in Southern Chile. *J. Nutr. Educ. Behav.* 2013, *45*, 443–449. [CrossRef]
10. Block, L.G.; Grier, S.A.; Childers, T.L.; Ebert, J.E.J.; Kumanyika, S.; Russell, N.; Machin, J.E.; Motley, C.M.; Pettigrew, S.; Scott, M.; et al. From Nutrients to Nurturance: A Conceptual Introduction to Food Well-Being.*J. Public Policy Mark.* 2011, *30*, 5–13. [CrossRef]
11. Meiselman, H.L. Quality of life, well-being and wellness: Measuring subjective health for foods and other products. *Food Qual. Prefer.* 2016, *54*, 101–109. [CrossRef]
12. King, S.C.; Snow, J.; Meiselman, H.L.; Sainsbury, J.; Carr, B.T.; McCafferty, D.; Serrano, D.; Gillette, M.; Millard, L.; Li, Q. Development of a questionnaire to measure consumer wellness associated with foods: The WellSense Profile^{TM}. *Food Qual. Prefer.* 2015, *39*, 82–94. [CrossRef]
13. Diener, E.; Ryan, K. Subjective well-being: A general overview. *S. Afr. J. Psychol.* 2009, *39*, 391–406. [CrossRef]
14. Bryła, P.Organic food consumption in Poland: Motives and barriers. *Appetite* 2016, *105*, 737–746. [CrossRef]
15. William, Y.; Kumju, H.; Seonaidh, M.; Caroline, J.O. Sustainable consumption: Green consumer behaviour when purchasing products. *Sustain. Dev.* 2010, *18*, 20–31.
16. Vega-Zamora, M.; Torres-Ruiz, F.J.; Murgado-Armenteros, E.M.; Parras-Rosa, M. Organic as a Heuristic Cue: What Spanish Consumers Mean by Organic Foods. *Psychol. Mark.* 2014, *31*, 349–359. [CrossRef]
17. Rizzato, M. *How Emotions and Social Interaction Affect Our Food Experience*; University of Udine: Udine, Italy, 2016.
18. Du, S.; Bartels, J.; Reinders, M.; Sen, S. Organic consumption behaviour: A social identification perspective.
Food Qual. Prefer. 2017, *62*, 190–198. [CrossRef]
19. Friese, M.; Basel, M.W.; Plessner, H. Implicit Consumer Preferences and Their Influence on Product Choice. *Psychol. Mark.* 2006, *23*, 727–740. [CrossRef]
20. Magnusson, M.K.; Arvola, A.; Hursti, U.K.K.; Åberg, L.; Sjödén, P.O. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite* 2003, *40*, 109–117. [CrossRef]
21. Massey, M.; O'Cass, A.; Otahal, P. A meta-analytic study of the factors driving the purchase of organic food. *Appetite* 2018, *125*, 418–427. [CrossRef]
22. Moser, A.K. Consumers' purchasing decisions regarding environmentally friendly products: An empirical analysis of German consumers. *J. Retail. Consum. Serv.* 2016, *31*, 389–397. [CrossRef]

23. Ismael, D.; Angelika, P. Consumers' Emotion Attitudes towards Organic and Conventional Food: A Comparison Study of Emotional Profiling and Self-Reported Method. *Foods* 2020, *9*, 79. [CrossRef] [PubMed]
24. Vermeir, I.; Verbeke, W. Sustainable food consumption: Exploring the consumer "attitude—Behavioural intention" gap. *J. Agric. Environ. Ethics* 2006, *19*, 169–194. [CrossRef]
25. Whitmarsh, L.; O'Neill, S. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J. Environ. Psychol.* 2010, *30*, 305–314. [CrossRef]
26. Salleh, M.M.; Ali, S.M.; Harun, E.H.; Jalil, M.A.; Shaharudin, M.R. Consumer's Perception and Purchase Intentions towards Organic Food Products. *Can. Soc. Sci.* 2010, *6*, 119–129.
27. Ryff, C.D.; Keyes, C.L.M. The Structure of Psychological Well-Being Revisited. *J. Personal. Soc. Psychol.* 1995,*69*, 719–727. [CrossRef]
28. Frank, M.; Andrews, S.B.W. *Social Indicators of Well-Being: Americans' Perceptions of Life Quality*; Springer Science & Business Media: Berlin/Heidelberg, Germany, 2012.
29. McMahon, A.T.; Williams, P.; Tapsell, L. Reviewing the meanings of wellness and well-being and their implications for food choice. *Perspect. Public Health* 2010, *130*, 282–286. [CrossRef]
30. Apaolaza, V.; Hartmann, P.; D'Souza, C.; López, C.M. Eat organic—Feel good? The relationship between organic food consumption, health concern and subjective wellbeing. *Food Qual. Prefer.* 2018, *63*, 51–62. [CrossRef]
31. Lee, H.J. Does consumption of organic foods contribute to Korean consumers' subjectivewell-being? *Sustainability* 2019, *11*, 5496. [CrossRef]
32. Meiselman, H.L. The future in sensory/consumer research: Evolving to a better science. *Food Qual. Prefer.* 2013, *27*, 208–214. [CrossRef]
33. Thøgersen, J.; de Barcellos, M.D.; Perin, M.G.; Zhou, Y. Consumer buying motives and attitudes towards organic food in two emerging markets: China and Brazil. *Int. Mark. Rev.* 2015, *32*, 389–413. [CrossRef]
34. Moser, A.K. Thinking green, buying green? Drivers of pro-environmental purchasing behaviour. *J. Consum. Mark.* 2015, *32*, 167–175. [CrossRef]
35. Chekima, B.; Oswald, A.I.; Wafa, S.A.W.S.K.; Chekima, K. Narrowing the gap: Factors driving organic food consumption. *J. Clean. Prod.* 2017, *166*, 1438–1447. [CrossRef]
36. Padel, S.; Foster, C. Exploring the gap between attitudes and behaviour Understanding why consumers buy or do not buy organic food. *Br. Food J.* 2005, *107*, 606–625. [CrossRef]
37. Aschemann-Witzel, J.; Niebuhr Aagaard, E.M. Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and in-store food choice. *Int. J. Consum. Stud.* 2014, *38*, 550–558. [CrossRef]
38. Terlau, W.; Hirsch, D. Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon-Causes and Measurements towards a Sustainable Development. *Int. J. Food Syst. Dyn.* 2015, *6*, 159–174.
39. Pearson, D.; Henryks, J.; Jones, H. Organic food: What we know (and do not know) about consumers. *Renew. Agric. Food Syst.* 2011, *26*, 171–177. [CrossRef]
40. Aschemann-Witzel, J.; Zielke, S. Can't Buy Me Green? A Review of Consumer Perceptions of and Behaviour Toward the Price of Organic Food. *J. Consum. Aff.* 2017, *51*, 211–251. [CrossRef]
41. Guillemin, I.; Marrel, A.; Arnould, B.; Capuron, L.; Dupuy, A.; Ginon, E.; Layé, S.; Lecerf, J.M.; Prost, M.; Rogeaux, M.; et al. How French subjects describe well-being from food and eating habits?

Development, item reduction and scoring definition of the Well-Being related to Food Questionnaire (Well-BFQ©). *Appetite* 2016, *96*, 333–346. [CrossRef]

42. Diener, E.; Wirtz, D.; Tov, W.; Kim-Prieto, C.; Choi, D.; Oishi, S.; Biswas-Diener, R. *New Measures of Well-Being*; Springer: Dordrecht, The Netherlands, 2009; Volume 39, ISBN 9048123496.
43. Geier, U.; Hermann, I.; Mittag, K.; Buchecker, K. First steps in the development of a psychological test on the effects of food on mental well-being. *J. Sci. Food Agric.* 2012, *92*, 2753–2756. [CrossRef]
44. Geier, U.; Büssing, A.; Kruse, P.; Greiner, R.; Buchecker, K. Development and application of a test for food-induced emotions. *PLoS ONE* 2016, *11*, e0165991. [CrossRef] [PubMed]
45. Cochran, W.G. *Sampling Techniques*, 2nd ed.; John Wiley and Sons, Inc.: New York, NY, USA, 1963.
46. Grunert, K.G.; Dean, M.; Raats, M.M.; Nielsen, N.A.; Lumbers, M. A measure of satisfaction with food-related life. *Appetite* 2007, *49*, 486–493. [CrossRef]
47. Ares, G.; Deliza, R.; Symoneaux, R.; Vidal, L.; de Moura, A.P.; Oliveira, D.; Claret, A.; Wright, A.; Jefferies, L.; Krystallis, A.; et al. Do we all perceive food-related wellbeing in the same way? Results from an exploratory cross-cultural study. *Food Qual. Prefer.* 2016, *52*, 62–73. [CrossRef]
48. Steptoe, A.; Pollard, T.M.; Wardle, J. Development of a Measure of the Motives Underlying the Selection of Food: The Food Choice Questionnaire. *Appetite* 2013, *25*, 267–284. [CrossRef]
49. Diener, E.; Wirtz, D.; Tov, W.; Kim-Prieto, C.; Choi, D.W.; Oishi, S.; Biswas-Diener, R. New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Soc. Indic. Res.* 2010, *97*, 143–156. [CrossRef]
50. Kinderman, P.; Schwannauer, M.; Pontin, E.; Tai, S. The development and validation of a general measure of well-being: The BBC well-being scale. *Qual. Life Res.* 2011, *20*, 1035–1042. [CrossRef]
51. ISO 11136 Sensory analysis Methodology. *General Guidance for Conducting Hedonic Tests with Consumers in a Controlled Area*; ISO: Geneva, Switzerland, 2014.
52. *DIN 10974 Sensorische Analyse Verbrauchertests (Sensory Analyses Consumer Sensory Evaluation)*; Beuth: Berlin, Germany, 2008.
53. King, S.C.; Sainsbury, J.; Meiselman, H.L.; Snow, J.; Gillette, M.; McCafferty, D. Measuring the wellness in "health and wellness". In Proceedings of the 5th European Conference on Sensory and Consumer Research, Bern, Switzerland, 9–12 September 2012.
54. Bee Lian, S.; Safari, M.; Mansori, S. The Marketing Stimuli Factors Influencing Consumers' Attitudes to Purchase Organic Food. *Int. J. Bus. Manag.* 2016, *11*, 109. [CrossRef]
55. Carrington, M.J.; Neville, B.A.; Whitwell, G.J. Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *J. Bus. Ethics* 2010, *97*, 139–158. [CrossRef]
56. Millock, K.; Hansen, L.G. *Willingness to Pay for Organic Foods: A Comparison between Survey Data and Panel Data from Denmark*; Munich Personal RePEc Archive: Munchin, Germany, 2002.
57. Aertsens, J.; Verbeke, W.; Mondelaers, K.; Van Huylenbroeck, G. Personal determinants of organic food consumption: A review. *Br. Food J.* 2009, *111*, 1140–1167. [CrossRef]
58. Lockie, S.; Lyons, K.; Lawrence, G.; Grice, J. Choosing organics: A path analysis of factors underlying the selection of organic food among Australian consumers. *Appetite* 2004, *43*, 135–146. [CrossRef]
59. Dangour, A.D.; Lock, K.; Hayter, A.; Aikenhead, A.; Allen, E.; Uauy, R. Nutrition-related health effects of organic foods: A systematic review. *Am. J. Clin. Nutr.* 2010, *92*, 203–210. [CrossRef] [PubMed]
60. Petrescu, D.C.; Petrescu-Mag, R.M.; Burny, P.; Azadi, H. A new wave in Romania: Organic food.

Consumers' motivations, perceptions, and habits. *Agroecol. Sustain. Food Syst.* 2017, *41*, 46–75. [CrossRef]
61. Hashmi, U.; Huong, N.T.; Wee, C.S. Key Factors Affecting Consumer Purchase Intention a Study of Safe Vegetable in Ho Chi Minh City, Vietnam. *Univ. Econ. Ho Chi Minh City Int. Sch. Bus.* 2012, *1*, 1–68.
62. Hamm, U.; Hemmerling, S.; Schleenbecker, R.; Spiller, A.; Wägeli, S.; Cordts, A.; Hermann, I.; Sonntag, I.; Kary, V. *Consumer Purchase and Consumption Behaviour Regarding Organic Food—Analysis of the State of the Art*; BÖLN Bericht 20055; University of Kassel and University of Göttingen: Göttingen, Germany, 2012; p. 119.
63. Vermeir, I.; Van Kenhove, P. The influence of need for closure and perceived time pressure on search effort for price and promotional information in a grocery shopping context. *Psychol. Mark.* 2005, *22*, 71–95. [CrossRef]
64. Lin, Y.-H.; Chen, C.-F. Passengers' shopping motivations and commercial activities at airports—The moderating effects of time pressure and impulse buying tendency. *Tour. Manag.* 2013, *36*, 426–434. [CrossRef]
65. Manolis, C.; Roberts, J.A. Subjective Well-being among Adolescent Consumers: The Effects of Materialism, Compulsive Buying, and Time Affluence. *Appl. Res. Qual. Life* 2012, *7*, 117–135. [CrossRef]
66. Nilsson, E.; Gärling, T.; Marell, A. Effects of time pressure, type of shopping, and store attributes on consumers' satisfaction with grocery shopping. *Int. Rev. Retail. Distrib. Consum. Res.* 2017, *27*, 334–351. [CrossRef]
67. Beattie, G.; Sale, L. Shopping to Save the Planet? Implicit Rather than Explicit Attitudes Predict Low Carbon Footprint Consumer Choice. *Int. J. Environ. Cult. Econ. Soc. Sustain. Annu. Rev.* 2011, *7*, 211–232. [CrossRef]
68. Koola, P.M.; Benjamin, P.; Schatz, S.; Colombo, G. A Methodology for Capturing and Fusing Unconscious Cognition with Computation. *Procedia Manuf.* 2015, *3*, 4129–4135. [CrossRef]
69. Kühn, S.; Brass, M. Retrospective construction of the judgement of free choice. *Conscious. Cogn.* 2009, *18*, 12–21. [CrossRef]
70. Desmet, P.M.A.; Schifferstein, H.N.J. Sources of positive and negative emotions in food experience. *Appetite* 2008, *50*, 290–301. [CrossRef] [PubMed]

Chapter 5: General Discussion

Consumer's sustainable food behaviour is considered the most inconsistent and unpredictable part of the whole supply chain of green products. This inconsistency impedes the efforts made to grow the share of the sustainable food market from the entire food market and, subsequently, narrows the gap between consumers' intentions to behave more sustainably and their actual behaviour at the marketplace [1]. It is therefore highly important to understand how consumers perceive and feel about these types of product, what they expect from their consumption and how they see its impact on the different aspects of their life. This understanding helps define which features to highlight when promoting green products.

5.1. The development of the colour scale

Our study, unlike the most common approach to investigating the relationship between colours and emotions, aimed to explore how consumers would express their provoked general positive and negative emotions using dark and light colours. Few studies have shown that the choice of colours (whether light or dark) is related to previously felt emotions, implying that using colours instead of words to express emotions is possible. However, this work is the first to develop an innovative method that detects implicit emotions depending on the association between colours and emotions combining eye-tracking technology with time pressure technique. The new method will be used to obtain spontaneous answers and avoid biased social desired answers as much as possible.

This work investigated the association between colours and emotions in two directions. First, based on the so-called colour-emotion association approach used in most previous studies, a web-based questionnaire was used to investigate how people would link two samples of light and dark colours to 23 emotion words (11 positive emotion terms, 11 negative emotions terms and one neutral term). Consistent with previous findings [2–11], the strong colour-emotion association was revealed in the results. Participants connected the samples of light colours with positive emotion terms such as happy, hopeful, encouraged, motivated, peaceful, fulfilled and other, while they connected the sample of the dark colours with negative emotion terms such as angry, sad, frustrated, irritated, discontented, envious, scared and others.

The second part of the questionnaire intended as an explicit measure to understand the emotion-colour association. This part was based on provoking participants' emotions and exploring which colour samples they would use to express those provoked emotions. The results showed that when participants had positive emotions, they tended to choose light colours. Orange, yellow and green were the first three chosen colours to express positive emotions. And, when participants had negative emotions, they tended to choose samples of dark colours to express what they were feeling (e.g. grey, brown, and black that were the first three chosen colours). It is worth mentioning that two previous studies conducted with children in 1965 and 1978 [12,13] reported that children used orange, yellow and green crayons after experiencing positive emotions and grey, brown, and black after experiencing negative emotions to colour their paintings.

Interestingly, the same colours appeared during this experiment. Those same colours along with colours that have been primarily chosen to express positive or negative emotions (for example, light blue, violet, dark green and brown) were selected to design the light and dark colour profile of the colour scale prototype to be used in the next experiment. Some colours such as white, red and dark red (wine colour) held a bilateral association, namely, they were associated with both positive and negative emotions at the same level. This bilateral association could have resulted from the cultural effect [8]. It is important to recall that when studying the colour-emotion association in the literature among different cultures, the effects of colours remained relatively consistent across studies [71]. Besides, Adams and Osgood [14] found similarities in the emotions provoked by colours among 23 different cultures. Nevertheless, those colours were not considered to be part of the colour scale.

After exploring the explicit association between emotions and colours, this work attempted to conduct a second experiment with the implicit method to confirm the implicit nature of the emotion-colour association. For this purpose, eye-tracking technology together with time pressure technique was applied in this experiment. The main aim was to use a measure that guarantees the minimum transition from unconscious to conscious by refraining participants from using too much time to think, read from a list, talk and discuss with the experimenter or write down their answers [15,16]. All what participants had to do was to move their eyes on the colour scale for 3 seconds after displaying an emotional stimulus.

This doctoral research, to the best of the authors' knowledge, is the first to use this approach of understanding the manner of using colours to express general positive and negative emotions. The results from the eye-tracking as an implicit method confirmed the results of SRQ as an explicit method. Participants tended to focus their eyes on the light colours as a way to express their evoked positive emotions and tended to focus on the dark colours for longer times to express their negative emotions. However, it was still questionable whether participants were affected by the colour of the emotional stimulus and the position of the dark and light colours. Thus, the experiment was designed to contain coloured and black and white stimuli, and the position of each colour set was alternated between right and left randomly. The results showed that neither the position of the colour set nor the stimulus' colour (chromatic or achromatic) had an impact on the participants' choice.

Based on the compatible results of SRQ and the eye-tracking experiment, it was concluded that colours could be used as a nonverbal method to express positive and negative emotions. Together with eye-tracking, the colour scale forms a powerful method that obtains intuitive responses.

The second posed question was, is it possible to use the newly developed method ''the colour scale'' during a sensory evaluation? This study attempted to employ the developed colour scale in a sensory evaluation to detect food-elicited emotions. The colour scale was combined with a traditional verbal emotion questionnaire to verify the validity of the scale.

The experiment composed of two parts. First, the participants were asked to test a food sample (taste, smell and visual) and then to declare their emotions using a classical verbal emotion questionnaire. In the second part, the participants were asked to use the colour scale to express their food-elicited emotions. Positive food-elicited emotions dominated through the food samples. The results of this experiment revealed a strong consistency between the results of the verbal emotion questionnaire and the colour scale. The high rates for positive emotion terms, when expressing positive emotions towards the tested sample, were accompanied with longer dwell time on the light colour set of the colour scale. The same compatibility was found between the rates of negative emotions and dwell time of the dark colour set.

The present findings confirm the possibility of using the colour scale as a non-intrusive method that avoids any deliberate action and obtains prompt responses to express general positive and negative emotions during sensory evaluation.

5.2. Defining the best method to report underlying food-related emotion attitudes

It is highly important to understand food-related emotions towards organic food as an essential part of the sustainable food market. If organic food-related emotions did not differ from the conventional, consumers would neither encounter a different emotional experience with consuming organic food nor have a special bond with the product. This difference would probably weaken the experience attributes of organic food compared to conventional ones. And, with the presence of other attractive search attributes (e.g. price and appearance) the conventional product could have the final advantage. Hence, it is required to choose the right method that reveals the consumer's real implicit emotion attitudes towards organic food. Therefore, the present study intended to explore the differences between the declared and elicited food emotion attitudes towards both organic and conventional food by applying three methods (cognitive survey and food test under informed and uninformed conditions). In this work, the reported emotions through the cognitive survey were

referred to as the food-declared emotions, while the reported emotions through the food test were referred to as the food-elicited emotions.

Several researchers observed that consumers exaggerate their attitudes towards behaviours that are related to sustainability. For instance, G. Beattie and L.McGuire [17] showed how the explicit measures, unlike the implicit measures, did not predict consumers' attitudes towards low carbon products. A. Greenwald et al. [18] and G. Beattie et al. [27] also discussed that consumers' attitudes reported in a traditional survey are different from the attitudes reported during a given related task.

This study carried out comparisons on two levels. First, a comparison of the attitudes between organic and conventional food was conducted through cognitive survey, as well as food test concerning under informed and uninformed conditions. Second, the differences in consumers' attitudes towards organic food/sample among those methods were investigated, the same comparison was applied for conventional.

The first comparison between the organic and conventional food was related to the ''taste'' attribute. Taste is a very important sensory attribute of a product. It is directly related to emotions and further to memories [20]. It is one of the strong features of the experience attributes of the product that have a significant effect on consumers' re-choice of that same product [21,22]. Hence, it is important to understand how consumers perceive the ''taste'' attribute of organic and conventional food.

In the cognitive survey, consumers declared that they prefer organic food for its better taste. However, in the uninformed food test, they liked the taste of some conventional samples more than the organic ones. Johansson et al. [23], D. Bourn et al. [24] and B. Ellison at al. [25] also reported no differences between organic and conventional food with regards to taste. The time gap between Johansson et al.'s study and our study is 21 years, yet the consumers still report that organic food has a better taste than conventional food even though the results show that they do not experience this reality. This outcome could be because of the nature of tasted samples; besides, the tested samples do not represent all organic or conventional food. The sensory attributes of a product depend on the personal preferences of the consumer as well as the product itself (e.g. the growing season or whether the product is fresh or processed). For instance, the results obtained by Vogtmann et al. [26] reported that two out of three organic varieties of tomato had better ''taste quality.'' According to ISO standards (ISO 13299), untrained panel usually responds according to their preferences, while the trained panel is more able to define the differences in sensory attributes including taste. Taste is one of the most important experienced attributes of a product. It plays a significant role in an individual's dietary behaviour and consumption habits [60-62]. This is why understanding how regular consumers perceive the taste is considered central to the marketers of organic food not only by self-reporting but more importantly by real consumption experience.

Whether there is a real difference between the taste of organic and conventional food or not, consumers' perception of a better taste of organic food over the conventional is a very important advantage in favour of the organic market. Arguably, self-reported methods are not the perfect methods to count on when assessing organic vs. conventional product with regards to sensory attributes.

The second comparison of organic vs. conventional was between food-declared emotions and food-elicited emotions. Comparing to organic food, it was obvious that consumers held high negative emotion attitudes towards the conventional food in general (in the cognitive survey) and the conventional sample (in the informed test with both implicit and explicit measures). Besides, emotion attitudes towards organic food were strongly positive in both cognitive survey and informed food test. However, in the uninformed food test, where assessors did not know the differences between the samples they were testing, their emotion attitudes towards organic and conventional were almost equal. Consumers overstated their positive emotions and their negative emotions towards conventional food when they are involved in a survey or test that explicitly serves both types. It is believed that the ''organic label'' plays a great role in this overstated attitude. Additionally,

consumer's attitudes may have also been affected by the preconceived knowledge about conventional food production and its main contribution to the environmental and natural resources damage. These results confirm previous findings on consumer's exaggerated positive attitudes towards sustainable food products [17,27–30]. Previous research reported that providing additional information about the tested product would lead to a higher state of positive attitudes [31–33], in this study the additional given information was the nature of the food (organic and conventional).

Moreover, when comparing consumers' attitudes towards organic food among the three applied methods, it is noticeable how consumers gave a higher rate for their positive emotion attitudes in the cognitive survey than the food consumption experience. Negative emotion attitudes towards conventional food in the cognitive survey were also stronger than the food consumption experience. This result shows how responses alter from methods that depend only on words to methods that involve a real-life experience, namely, from ''say to do''.

From the results in Chapter 3, it is clear that the consumers' emotion attitudes do not only differ according to the nature of the studied target (organic vs. conventional) but also according to the applied methods (cognitive survey, informed food test and uninformed food test). Some applied methods do not necessarily reflect the real attitudes of consumers.

The overall comparison between the cognitive survey, informed and uninformed food test showed that food consumption experience under uninformed condition represents the best method for reporting positive and negative emotion attitudes towards organic and conventional food as consumers are not subjected to the influence of the organic label nor to the negative stereotype that is obtained by previous knowledge on the negative impact of the conventional production system.

5.3. The attitude-behaviour gap

Attitude-behaviour gap or the intention-behaviour gap (IBG), is defined as a situation where people state a specific attitude but not fully behave according to it. Most of the previous literature highlights the strong occurrence of the IBG in the food market, in particular, the sustainable food market [34–37]. IBG is determined by either applying self-reported methods or observing the consumers behaviour in the supermarkets. The present study in chapter 3 and 4 demonstrated how consumers' intention to buy organic food is higher than their actual daily purchases. Although the sensory test is not a purchase behaviour, it can be considered a consumption behaviour. Thus, declaring higher positive attitudes towards organic food in a self-reported method than during a sensory test could also be considered one form of the attitude-behaviour gap. In Chapter 3, the rapid forced-choice also showed another side of the attitude-behaviour gap. Participants who declared higher positive emotions towards organic food were less likely to choose the organic juice bottle.

Furthermore, this work investigated the barriers of the attitude-behaviour gap from the consumers' perception. Chapter 4 revealed various barriers behind the attitude-behaviour gap. The barriers varied between personal and external factors. Some barriers were related to the organic production system (e.g. producing, certifying system, packaging, etc), while others were related to sensory attributes of the organic product itself including marketing methods. However, in line with the idea of the role of the premium price, availability, sensory attributes, trust and others, it can be concluded that the same reasons behind the organic attitude-behaviour gap still appear even in more recent investigations. Several approaches were suggested before to narrowing this gap such as the detailed action planning [38], perceived self-efficacy [39] and action control [40] open innovation [41]. Yet, as the gap is still being reported as one of the main challenges in organic food marketing, stronger approaches to encourage and motivate consumers to overcome those obstacles are highly important and required.

5.4. The effect of organic food consumption and OIBG on consumers' wellbeing

Food consumption is a hedonic experience, people seek pleasure and enjoyment when choosing what and when to eat [42]. Organic food consumption has rather a wider concept that goes beyond personal pleasure. It is not only related to the pleasure-seeking aspect but also other internal aspects such as health, social life, intellectual life and external values such as the environment, animals and planet. Simply put, organic food has a multidimensional effect on individuals' lives.

Wellbeing is a broad concept that provides a more holistic view of life involving physical health, emotional, social, and intellectual aspects of a person's life. Therefore, researchers have been interested recently to understand how food consumption affects subjective wellbeing with its different dimensions. Yet, only a few works have addressed the effect of organic food consumption on subjective wellbeing [43,44].

As OIBG is one of the significant challenges that face the organic food market, the authors believe that it is essential also to understand how this gap affects subjective wellbeing. This doctoral research was, to the best of the authors' knowledge, the first to bring to light the potential impact of OIBG on consumers' subjective wellbeing considering the physical, emotional, social and intellectual dimensions. The present study was also interested in understanding how participants relate organic food consumption with the concept of wellbeing and their perceived impact of organic food consumption on their subjective wellbeing. The investigation was carried out using two methods: self-administered questionnaire and food consumption experience.

The first, method, the self-administered questionnaire showed that the consumers linked the concept of wellbeing mostly to the ''health'' aspect. These findings were in line with previous research [45–47], where ''health'' is the most relevant term mentioned by consumers when linking the concept of organic food with the term ''wellbeing.'' Emotions, on the other hand, play a significant bidimensional role in organic food consumption. Consumers' emotions towards the organic product may encourage consumers to choose it and, at the same time, consumers would report positive emotional impact after consuming organic food. The result of the present study also demonstrated that emotions form a secure link between organic food consumption and subjective wellbeing. A similar conclusion was reached by G. Ares et al. [46] and E. Nilsson et al. [48].

When consumers were asked about the impact of organic food consumption on their subjective wellbeing, the primary findings were consistent with other research [45–47] reporting that consumers believe organic food consumption increases their overall satisfaction with life, and their subjective wellbeing on physical, emotional and social levels. Confirming that consumers perceive the positive effect of organic food consumption on their emotions, health, social life and intellectual purpose of life is an important contribution to the global trend in highlighting the advantages of organic food not only for the environment and animal welfare but also for humans' wellbeing.

The second way in which this study investigated the effect of organic food vs. conventional food on wellbeing is by exploring the effects on the body's mental and physical parameters during an informed food consumption experience. In general, consumers did not feel any significant differences between the organic vs. conventional stimuli regarding their wellbeing parameters. In other words, organic and conventional food intake could have the same effect on consumers' mental and physical parameters. This finding is important for two reasons. First, the label effect does not by necessity influence the outcomes of an investigation related to organic and conventional food. Second, when it comes to declaring an opinion about organic food consumption, consumers would declare a positive one. This opinion could have been based on the premise of the benefits of green consumption instead of being based on real-life experience. Notwithstanding the previous, this positive psychological effect on the subjective wellbeing is always welcome as an advantage for organic food. After all, organic food as a strong representative of sustainability still has its positive effects on the environment, animal welfare and even the economies of local producers [49].

The second, and most important, question that was posed by this work is how do consumers perceive the impact of the intention-behaviour gap in organic food consumption on their subjective wellbeing including its four dimensions: physical, emotional, social and intellectual?

It worth noting that consumers previously declared that consuming organic food enhanced the physical, emotional and social aspects of their wellbeing, though they did not perceive any negative impact on their subjective wellbeing that could be caused by consuming less organic than what was intended. However, when they were asked separately to declare in their own words the influence of OIBG on their emotions, various negative emotion terms were revealed.

After the results of the positive effect of organic food consumption on subjective wellbeing, it was expected to see that consumers would have believed that the gap has an impact on their health or social image or purpose in life. Perceiving no effect of the OIBG could have an impact on consumers' willingness to bridge this gap and adopt more organic food into their diet, and marketers need to understand this point. Besides, even though consumers do not perceive any negative effect of OIBG on their subjective wellbeing, they reported separately the negative provoked emotions by this gap. In other words, consumers believe in the negative impact of the OIBG on one individual aspect (emotions) of wellbeing but not the whole concept. This result is significant as it gives better insight for marketers to know which aspects to highlight when promoting organic food.

Based on the present findings, we suggest that effective marketing campaigns for organic food should be designed to appeal to the effective wellbeing benefits from a consumers' perspective. Such advertisements should not only present the organic product as good for the environment but also emphasize how consumers would gain more positive wellbeing status including emotional, physical health, social and intellectual benefits [50].

5.5. Scientific contribution

This doctoral research contributes to the efforts made to improve the understanding of consumers' emotions, attitudes, perceptions and behaviour regarding organic food by putting forward three concepts in a way that have not been addressed before. First, an innovative method called the colour scale was developed to be used as a non-intrusive method that captures consumer's implicit food-elicited emotions in a sensory test. Second, the study investigated different methods to detect the real emotion attitudes towards organic and conventional samples and suggested that the sensory evaluation under uninformed conditions are considered the best method among the other tested methods. Moreover, this study showed the intention-behaviour gap in consumers' organic daily purchase and during a lab experiment under time pressure. Another significant contribution is that the study demonstrated how consumers believe there is a positive effect related to organic food consumption to their wellbeing in general, including their health, emotions, intellect and social image. However, participants do not believe that the intention-behaviour gap affects their wellbeing or any of its dimensions.

Several strategies can be followed to encourage the consumer's level of involvement in more sustainable food consumption. The preconceived notion of a product is highly important in organic food marketing tactics. Focusing on the credence attributes of each organic and conventional product is one of the strategies that could count to promote organic food consumption over conventional.

It is advisable to maximise the advertising of the credence attributes of the organic product such as sustainability, health, and animal welfare, comparing to conventional. This could be achieved by improving consumers' awareness of these credence attributes. Awareness is improved through knowledge that can be delivered through education, media, marketing campaigns and promotions. Besides, enhancing the knowledge on the credence benefits of organic food the production costs would help increase the willingness to pay the premium price for such sustainable food products. As environmental problems are global and critical, it is recommended that the knowledge on the importance of the sustainable food system be available and stressed throughout the curricula, from early schooling through higher education programs. A study conducted in eight European universities on the students' knowledge and expectations about sustainable food systems in higher

education revealed that even in European universities the sustainable food system is not covered enough in the higher education programs. The study stressed the necessity to improve the educational programs of sustainable food systems to gain more knowledge about the complex vision of sustainability [51].

Moreover, it is essential to note that organic consumers could be divided according to personal reasons for being interested in organic products. Some consumers can be described as hedonistic who are motivated by the experience attributes of the organic product (e.g. taste, smell and appearance) or the concept of ''prestige product''. Other consumers can be described as ethical consumers that are motivated by the ethical obligation towards their health, the environment, and animal welfare [1]. In this regard, marketing strategies should be diverse. Marketing techniques that reach consumer's senses, the so-called ''sensory marketing'', are great motivational techniques for the hedonistic consumers [52]. On the other hand, Nudge marketing [53], a technique that steers consumers through self-obligation and points out the value of the credence attributes of organic food to stimulate their willingness to pay for more sustainable behaviour, can be looked on as good strategy to motivate ethical consumers.

As a whole, advertising and promoting organic food against conventional food should emphasize the aspects that consumers perceive to have a positive effect on their life such as emotions, image, purpose in life, health and their contribution to a healthier earth. An important implication of this study is to boost organic food behaviour by understanding consumers' emotions and emphasizing the positive impact of the organic consumption not only on emotions but rather on other aspects of their subjective wellbeing. Additionally, marketers need to be aware of how consumers perceive the effect of OIBG on their life. Given the understanding of emotions that lie behind consumers' consumption behaviour and decision-making, this area has become an important challenge in marketing and consumer behaviour research. The present results have the potential to positively impact organic food marketing and enhance the methods of measuring consumers' attitudes that eventually may impact their organic food behaviour.

5.6. Towards more sustainable food systems: strategies and initiatives

The Sustainable Development Goals (SDGs) set by the United Nations are global goals that aim to achieve a better sustainable future. Several efforts represented by strategies and initiatives were made to accomplish those goals. Such actions are highly important to promote the food sustainability concept [63]. They seek to empower consumers to choose more sustainable consumption and raise people's awareness of how to adopt a more sustainable food system. The Economics of Ecosystems and Biodiversity for Agriculture & Food (TEEBAgriFood) Initiative and The European Green Deal are two of the most important actions towards a fair, healthy and environmentally-friendly food system.

The European Green Deal [64] aims to turn Europe into the first climate-neutral continent by 2050. It is strongly represented by the Farm to Fork Strategy works in agreement with the SDGs. The strategy believes that healthy people form healthy societies which lead to a healthy planet. It addresses a comprehensive approach to Europeans food habits and their perception of a sustainable food lifestyle. Farm to Fork Strategy aims to improve consumer's wellbeing including quality of life, health, social life and food environment addressing the consequences that occur during and after the COVID-19 pandemic. This pandemic underlines the harsh outcome of unsustainable practices and emphasizes the value of food sustainability. The scheme of this strategy is focused on several factors, more importantly, to build the best model of a sustainable food chain that benefits consumers, producers and the planet fights fraud along the chain, ensures food security, promotes sustainable food consumption, reduces food waste and facilitates the transition to healthy sustainable diets. Further, the approach of this strategy is to support research, innovation, technology and investments, in addition to providing advisory services to raise knowledge and develop new skills. Figure 1 demonstrates the principles of the From Farm to Fork Strategy.

Figure 1. Main principles of Farm to Fork Strategy (source: [64]).

On the other hand, the United Nations Environment Programme (UN Environment) has launched TEEBAgriFood initiative that aims to evaluate agriculture and food systems together with their value chains considering their most important externalities (consumer's choices/activities and policies) [65]. The initiative involves research and capacity-building projects and depends on scientific and economical literature to fix food metrics. It also presents a thorough economical evaluation of the eco-agri-food systems complex along with its influences on human wellbeing and natural environment and highlights the significant positive and negative impact of the externalities on the economic environment. The core approach of TEEBAgriFood can be summarized as: ''It is neither possible nor sensible to isolate impacts and dependencies of primary agricultural production (within the farm gate) from the rest of the eco-agri-food system if we are to find truly sustainable and equitable solutions to the agri-food challenges we face.''

Years of policymaking made European food a global standard for healthy, high quality, safe and nutritious food. Achieving the goals of narrowing or eliminating the intention-behaviour gap in sustainable food consumption and enhance not only consumers' wellbeing but rather the wellbeing of all actors in the food chain requires the power of policy, knowledge and consumer's willpower. Therefore, such strategies and initiatives could support the food policies to make European food a global standard for sustainability, which could finally lead to achieving the complete approach of a sustainable food system worldwide.

5.7. Limitation

Apart from the importance of the addressed issues in this study and the fact that the research was the first to address such issues in organic food research, this work lacks the cultural aspect. It is well-known that emotions, attitudes, perceptions and behaviour are subjected among various factors to the cultural effect [14,54,55]. Therefore, further research that investigates the culture effect on each investigated issue in this research work is required.

There has been a controversial discussion about the value of organic food to personal health and the environment. This uncertainty was clear in the outcomes of the survey in chapter 4. Some consumers have a clear distrust in the organic food market. Trust in organic (labelling and certifying)

is another important factor which influences the organic food consumption behaviour [56]. Some European studies have found that consumers tend to distrust certification bodies, leading them to question the genuineness of organic products [57,58]. Some research reported regular organic food consumers who expressed uncertainty whether something labelled organic is actually ''organic''. They also reported that occasional organic food consumers gave a high number of negative statements related to issues of trust and insecurity in labelling [56]. It is, therefore, questionable whether people who distrust the organic food system can make valuable contributions in studies related to the organic food consumption and its drivers, barriers and effects

Future research on how different cultures perceive the gap between their intentions to consume sustainably and their real behaviour, and how this gap affects their wellbeing is highly required. Moreover, bridging the gap is not only the responsibility of marketers, policymakers or producers, it also depends greatly on the consumer's willpower. Therefore, it is always important to understand how consumers' think, feel and decide, and this understanding most be always up-to-date as the lifestyle and the technology are changing rapidly and the consumer's way of making a decision is changing too.

Reference

1. Terlau, W.; Hirsch, D. Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon-Causes and Measurements towards a Sustainable Development. *Int. J. Food Syst. Dyn.* 2015, *6*, 159–174.
2. Bortoli, M. De; Maroto, J. Colours Across Cultures: Translating Colours in Interactive Marketing Communications. In Proceedings of the Elicit 2001: Proceedings of the European Languages and the Implementation of Communication and Information Technologies (Elicit) conference; UK: Paisley University Language Press, 2001; pp. 3–4.
3. Boyatzis, C.J.; Varghese, R. Children's emotional associations with colours. *J. Genet. Psychol.* 1994, *155*, 77–85.
4. Gil, S.; Le Bigot, L. Seeing life through positive-tinted glasses: Colour-meaning associations. *PLoS One* 2014, *9*.
5. Hemphill, M. A note on adults' colour–emotion associations. *J. Genet. Psychol.* 1996, *157*, 275–280.
6. Manav, B. Colour-emotion associations and colour preferences: A case study for residences. *Colour Res. Appl.* 2007, *32*, 144–150.
7. Vainio, S.H. A cross-cultural comparison of colour-emotion associations of Finland, Norway, China and Greece. 2016.
8. Kaya, N.; Epps, H.H.; Hall, D. Relationship Between Colour and Emotion: A Study of College Students. *Coll. Student J* 1998, *38*, 396–406.
9. Kaya, N.; Crosby, M. Colour associations with different building types: An experimental study on American college students. *Colour Res. Appl.* 2006, *31*, 67–71.
10. Kaya, N.; Epps, H.H. Colour-Emotion Associations: Past Experience and Personal Preference. In Proceedings of the AIC 2004 Colour and Paints, Interim Meeting of the International Colour Association; Brazil, 2004; Vol. 5, pp. 31–34.
11. Manav, B. Colour-emotion associations, designing colour schemes for urban environment-architectural settings. *Colour Res. Appl.* 2017, 631–640.
12. Cimbalo, R.S.; Beck, K.L.; Sendziak, D.S. Emotionally toned pictures and colour selection for children and college students. *J. Genet. Psychol.* 1978, *133.2*, 303–304.
13. Lawler, C.O.; Lawler III EE Colour-mood associations in young children. *J. Genet. Psychol.* 1965, *107*, 29–

32.
14. Adams, F.M.; Osgood, C.E. A Cross-Cultural Study of the Affective Meanings of Colour. *J. Cross. Cult. Psychol.* 1973, *4*, 135–156.
15. Koola, P.M.; Benjamin, P.; Schatz, S.; Colombo, G. A Methodology for Capturing and Fusing Unconscious Cognition with Computation. *Procedia Manuf.* 2015, *3*, 4129–4135.
16. Kühn, S.; Brass, M. Retrospective construction of the judgement of free choice. *Conscious. Cogn.* 2009, *18*, 12–21.
17. Beattie, G.; McGuire, L. See no evil? Only implicit attitudes predict unconscious eye movements towards images of climate change. *Semiotica* 2012, *2012*, 315–339.
18. Greenwald, A.G.; Nosek, B.A. Attitudinal Dissociation: What Does it Mean? In *Attitudes: Insights from the New Implicit Measures*; Psychology Press., 2008; pp. 85–102.
19. Clugston, R.; Calder, W. Food and Higher Education for Sustainable Development. *J. Educ. Sustain. Dev.* 2007, *1*, 209–218.
20. Moore, D.J.; Konrath, S. "I can almost taste it:" Why people with strong positive emotions experience higher levels of food craving, salivation and eating intentions. *J. Consum. Psychol.* 2015.
21. Gottschalk, I.; Leistner, T. Consumer reactions to the availability of organic food in discount supermarkets. 2013, *37*, 136–142.
22. Massey, M.; O'Cass, A.; Otahal, P. A meta-analytic study of the factors driving the purchase of organic food. *Appetite* 2018, *125*, 418–427.
23. Johansson, L.; Haglund, Å.; Berglund, L.; Lea, P.; Risvik, E. Preference for tomatoes, affected by sensory attributes and information about growth conditions. *Food Qual. Prefer.* 1999, *10*, 289–298.
24. Bourn, D.; Prescott, J. A comparison of the nutritional value, sensory qualities, and food safety of organically and conventionally produced foods. *Crit. Rev. Food Sci. Nutr.* 2002, *42*, 1–34.
25. Ellison, B.; Duff, B.R.L.; Wang, Z.; White, T.B. Putting the organic label in context: Examining the interactions between the organic label, product type, and retail outlet. *Food Qual. Prefer.* 2016, *49*, 140–150.
26. Vogtmann, H.; Matthies, K.; Kehres, B.; Meier-Ploeger, A. Enhanced Food Quality: Effects of Composts on the Quality of Plant Foods. *Compost Sci. Util.* 1993, *1*, 82–100.
27. Beattie, G.; McGuire, L.; Sale, L. Do we actually look at the carbon footprint of a product in the initial few seconds? An experimental analysis of unconscious eye movements. *Int. J. Environ. Cult. Econ. Soc. Sustain.* 2010, *6*, 47–66.
28. Dane, E.; Pratt, M.G. Exploring Intuition and Its Role in Managerial Decision Making. *Source Acad. Manag. Rev. Acad. Manag. Rev.* 2007, *32*, 33–54.
29. Leeuw, E.D. de; Joop Hox, D.D. *International Handbook of Survey Methodology*; Routledge, 2008;
30. Tseng, K.C. Behavioural finance, bounded rationality, neuro-finance, and traditional finance. *Invest. Manag. Financ. Innov.* 2006, *3*, 7–18.
31. Spinelli, S.; Masi, C.; Zoboli, G.P.; Prescott, J.; Monteleone, E. Emotional responses to branded and unbranded foods. *Food Qual. Prefer.* 2015, *42*, 1–11.
32. Gmuer, A.; Nuessli Guth, J.; Runte, M.; Siegrist, M. From emotion to language: Application of a systematic, linguistic-based approach to design a food-associated emotion lexicon German. *Food Qual. Prefer.* 2015, *40*, 77–86.
33. Thomson, D.M.H.; Crocker, C.; Marketo, C.G. Linking sensory characteristics to emotions: An example using dark chocolate. *Food Qual. Prefer.* 2010, *21*, 1117–1125.

34. Joshi, Y.; Rahman, Z. Investigating the determinants of consumers' sustainable purchase behaviour. *Sustain. Prod. Consum.* 2017, *10*, 110–120.
35. Moser, A.K. Thinking green, buying green? Drivers of pro-environmental purchasing behaviour. *J. Consum. Mark.* 2015, *32*, 167–175.
36. Buder, F.; Feldmann, C.; Hamm, U. Why regular buyers of organic food still buy many conventional products: Product-specific purchase barriers for organic food consumers. *Br. Food J.* 2014, *116*, 390–404.
37. Sultan, P.; Tarafder, T.; Pearson, D.; Henryks, J. Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: moderating roles of communication, satisfaction and trust in organic food consumption. *Food Qual. Prefer.* 2020, *81*, 103838.
38. Zhou, G.; Sun, C.; Knoll, N.; Hamilton, K.; Schwarzer, R. Self-efficacy, planning and action control in an oral self-care intervention. *Health Educ. Res.* 2015, *30*, 671–681.
39. Bandura, A. Self-efficacy: The exercise of Control. *New York WH Free. Books/Henry Holt Co* 1997.
40. Sniehotta, F.F.; Scholz, U.; Schwarzer, R. Bridging the intention – behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychol. & Heal.* 2005, *20*, 143–160.
41. Fink, L.L.; Ploeger, A.; Strassner, C. Sustainable diets: Studies on German consumers' intention-behaviour gap, 2020.
42. Alba, J.W.; Williams, E.F. Pleasure principles: A review of research on hedonic consumption. *J. Consum. Psychol.* 2013, *23*, 2–18.
43. Apaolaza, V.; Hartmann, P.; D'Souza, C.; López, C.M. Eat organic – Feel good? The relationship between organic food consumption, health concern and subjective wellbeing. *Food Qual. Prefer.* 2018, *63*, 51–62.
44. Lee, H.J. Does consumption of organic foods contribute to Korean consumers' subjective well-being? *Sustain.* 2019, *11*.
45. King, S. C., Sainsbury, J., Meiselman, H. L., Snow, J., Gillette, M., McCafferty, D. Measuring the wellness in '"health and wellness"'. In 5th European conference on sensory and consumer research, 9–12 September 2012.; Bern, Switzerland, 2012.
46. Ares, G.; de Saldamando, L.; Giménez, A.; Claret, A.; Cunha, L.M.; Guerrero, L.; de Moura, A.P.; Oliveira, D.C.R.; Symoneaux, R.; Deliza, R. Consumers' associations with wellbeing in a food-related context: A cross-cultural study. *Food Qual. Prefer.* 2015, *40*, 304–315.
47. King, S.C.; Snow, J.; Meiselman, H.L.; Sainsbury, J.; Carr, B.T.; McCafferty, D.; Serrano, D.; Gillette, M.; Millard, L.; Li, Q. Development of a questionnaire to measure consumer wellness associated with foods: The WellSense Profile™. *Food Qual. Prefer.* 2015, *39*, 82–94.
48. Nilsson, E.; Gärling, T.; Marell, A. Effects of time pressure, type of shopping, and store attributes on consumers' satisfaction with grocery shopping. *Int. Rev. Retail. Distrib. Consum. Res.* 2017, *27*, 334–351.
49. Seppänen, L. *Local and organic food and farming around the Baltic Sea*; Sveriges lantbruksuniv, 2004; ISBN 9157666369.
50. Qasim, H.; Yan, L.; Guo, R.; Saeed, A.; Ashraf, B.N. The defining role of environmental self-identity among consumption values and behavioural intention to consume organic food. *Int. J. Environ. Res. Public Health* 2019, *16*.
51. Veromann, P.M.A.W.E.; Strassner, C.; Średnicka-Tober, D.; Kahl, J.; Bügel, S.; Briz, T.; Kazimierczak, R.; Brives, H.; Ploeger, A.; Lüder, V.; et al. Students' knowledge and expectations about sustainable food systems in higher education. *Int. J. Sustain. High. Educ.* 2020.

52. Krishna, A.; Cian, L.; Sokolova, T. The power of sensory marketing in advertising. *Curr. Opin. Psychol.* 2016, *10*, 142–147.
53. Vandenbroele, J.; Vermeir, I.; Geuens, M.; Slabbinck, H.; Van Kerckhove, A. Nudging to get our food choices on a sustainable track. *Proc. Nutr. Soc.* 2020, *79*, 133–146.
54. Gao, X.P.; Xin, J.H.; Sato, T.; Hansuebsai, A.; Scalzo, M.; Kajiwara, K.; Guan, S.S.; Valldeperas, J.; Lis, M.J.; Billger, M. Analysis of cross-cultural colour emotion. *Colour Res. Appl.* 2007, *32*, 223–229.
55. Thøgersen, J.; de Barcellos, M.D.; Perin, M.G.; Zhou, Y. Consumer buying motives and attitudes towards organic food in two emerging markets: China and Brazil. *Int. Mark. Rev.* 2015, *32*, 389–413.
56. Padel, S.; Foster, C. Exploring the gap between attitudes and behaviour Understanding why consumers buy or do not buy organic food. *Br. Food J.* 2005, *107*, 606–625.
57. Hashmi, U.; Huong, N.T.; Wee, C.S. Key Factors Affecting Consumer Purchase Intention a Study of Safe Vegetable in Ho Chi Minh City , Vietnam. *Univ. Econ. Ho Chi Minh City Int. Sch. Bus.* 2012, *1*, 1–68.
58. Petrescu, D.C.; Petrescu-Mag, R.M.; Burny, P.; Azadi, H. A new wave in Romania: organic food. Consumers' motivations, perceptions, and habits. *Agroecol. Sustain. Food Syst.* 2017, *41*, 46–75.
59. ISO 13299 Sensory analysis Methodology. General Guidance for establishing a sensory profile; ISO: Geneva, Switzerland; ISO: Geneva, Switzerland, 2016.
60. Biloukha, O.; Utermohlen, V. Healthy eating in Ukraine: attitudes, barriers and information sources. Public Health Nutr. 2001, 4, 207–215.
61. Kourouniotis, S.; Keast, R.S.J.; Riddell, L.J.; Lacy, K.; Thorpe, M.G.; Cicerale, S. The importance of taste on dietary choice, behaviour and intake in a group of young adults. Appetite 2016, 103, 1–7.
62. Drewnowski, A.; Mennella, J.A.; Johnson, S.L.; Bellisle, F. Sweetness and Food Preference. J. Nutr. 2012, 142, 1142–1148.
63. United Nations. Sustainable Development Goals. 2016. Retrieved from: http://www.un.org/sustainabledevelopment/sustainable-development-goals. (accessed on 12/06/2020).
64. European Commission Farm to Fork Strategy For a fair, healthy and environmentally-friendly food system; 2020. Retrieved from: https://ec.europa.eu/food/farm2fork_en (accessed on 27/07/2020).
65. Zhang, W., Gowdy, J., Bassi, A.M., Santamaria, M., DeClerck, F., Adegboyega, A., Andersson, G.K.S.; Augustyn, A.M., Bawden, R., Bell, A., Darknhofer, I., Dearing, J., Dyke, J., Failler, P., Galetto, L., Hernández, C.C., Johnson; P., Jones, S.K., Kleppel, G., Komarek, A.M., Latawiec, A., Mateus, R., McVittie, A., Ortega, E., Phelps, D., Ringler, C., Sangha; K.K., Schaafsma, M., Scherr, S., Hossain, M.S., Thorn, J.P.R., Tyack, N., Vaessen, T., Viglizzo, E., Walker, D., Willemen, L. and; Wood, S.L.R. Systems thinking: an approach for understanding 'eco-agri-food systems'; 2018; ISBN 9789280737028

Chapter 6: Bibliography of the Thesis (full list)

A

Abril, P.S.; Olazábal, A.M.; Cava, A. Marketing and the Law. J. Acad. Mark. Sci. 2009, 37, 375–380.

Acker, F. Conscious versus unconscious thought. Judgm. Decis. Mak. 2008, 3, 292–303.

Adams, F.M.; Osgood, C.E. A Cross-Cultural Study of the Affective Meanings of Colour. J. Cross. Cult. Psychol. 1973, 4, 135–156.

Aertsens, J.; Verbeke, W.; Mondelaers, K.; Van Huylenbroeck, G. Personal determinants of organic food consumption: a review. Br. Food J. 2009, 111, 1140–1167.

Ahmad, S.N.B.; Juhdi, N. Consumer's perception and purchase intentions towards organic food products: exploring the attitude among Malaysian consumers. 16th Annu. Conf. Pacific Basin Financ. Econ. Account. Manag. 2008, 6, 1–15.

Adams, F.M.; Osgood, C.E. A Cross-Cultural Study of the Affective Meanings of Colour. J. Cross. Cult. Psychol. 1973, 4, 135–156.

Ajzen, I. The theory of planned behaviour. Organ. Behav. Hum. Decis. Process. 1991, 50, 179–211.

Alba, J.W.; Williams, E.F. Pleasure principles : A review of research on hedonic consumption. J. Consum. Psychol. 2013, 23, 2–18.

Antje Risius, U.H. Consumer segmentation based on attitudes - Does information change it all? 2017, 2, 229–235.

Antonetti, P.; Maklan, S. Feelings that Make a Difference: How Guilt and Pride Convince Consumers of the Effectiveness of Sustainable Consumption Choices. J. Bus. Ethics 2014, 124, 117–134.

Apaolaza, V.; Hartmann, P.; D'Souza, C.; López, C.M. Eat organic – Feel good? The relationship between organic food consumption, health concern and subjective wellbeing. Food Qual. Prefer. 2018, 63, 51–62.

Ares, G.; de Saldamando, L.; Giménez, A.; Claret, A.; Cunha, L.M.; Guerrero, L.; de Moura, A.P.; Oliveira, D.C.R.; Symoneaux, R.; Deliza, R. Consumers' associations with wellbeing in a food-related context: A cross-cultural study. Food Qual. Prefer. 2015, 40, 304–315.

Ares, G.; De Saldamando, L.; Giménez, A.; Deliza, R. Food and wellbeing. Towards a consumer-based approach. Appetite 2014, 74, 61–69.

Ares, G.; Deliza, R.; Symoneaux, R.; Vidal, L.; de Moura, A.P.; Oliveira, D.; Claret, A.; Wright, A.; Jefferies, L.; Krystallis, A.; et al. Do we all perceive food-related wellbeing in the same way? Results from an exploratory cross-cultural study. Food Qual. Prefer. 2016, 52, 62–73.

Ares, G.; Jaeger, S.R. A comparison of five methodological variants of emoji questionnaires for measuring product elicited emotional associations: An application with seafood among Chinese consumers. Food Res. Int. 2017, 99, 216–228.

Aschemann-Witzel, J.; Niebuhr Aagaard, E.M. Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and in-store food choice. Int. J. Consum. Stud. 2014, 38, 550–558.

Aschemann-Witzel, J.; Zielke, S. Can't Buy Me Green? A Review of Consumer Perceptions of and Behaviour Toward the Price of Organic Food. J. Consum. Aff. 2017, 51, 211–251.

Asif, M.; Xuhui, W.; Nasiri, A.; Ayyub, S. Determinant factors influencing organic food purchase intention and the moderating role of awareness: A comparative analysis; Elsevier, 2018; Vol. 63.

B

Bandura, A. Self-efficacy: The Exercise of Control. New York WH Free. Books/Henry Holt Co 1997.

Beattie, G.; McGuire, L. See no evil? Only implicit attitudes predict unconscious eye movements towards images of climate change. Semiotic 2012, 2012, 315–339.

Beattie, G.; McGuire, L.; Sale, L. Do we actually look at the carbon footprint of a product in the initial few seconds? An experimental analysis of unconscious eye movements. Int. J. Environ. Cult. Econ. Soc. Sustain. 2010, 6, 47–66.

Beattie, G.; Sale, L. Shopping to Save the Planet? Implicit Rather than Explicit Attitudes Predict Low Carbon Footprint Consumer Choice. Int. J. Environ. Cult. Econ. Soc. Sustain. Annu. Rev. 2011, 7, 211–232.

Bee Lian, S.; Safari, M.; Mansori, S. The Marketing Stimuli Factors Influencing Consumers' Attitudes to Purchase Organic Food. Int. J. Bus. Manag. 2016, 11, 109.

Biswas, A.; Roy, M. Leveraging factors for sustained green consumption behaviour based on consumption value perceptions: testing the structural model. J. Clean. Prod. 2015, 95, 332–340.

Biloukha, O.; Utermohlen, V. Healthy eating in Ukraine: attitudes, barriers and information sources. Public Health Nutr. 2001, 4, 207–215.

Block, L.G.; Grier, S.A.; Childers, T.L.; Davis, B.; Ebert, J.E.J.J.; Kumanyika, S.; Laczniak, R.N.; Machin, J.E.; Motley, C.M.; Peracchio, L.; et al. From nutrients to nurturance: A conceptual introduction to food well-being. J. Public Policy Mark. 2011, 30, 5–13.

Block, L.G.; Grier, S.A.; Childers, T.L.; Ebert, J.E.J.; Kumanyika, S.; Russell, N.; Machin, J.E.; Motley, C.M.; Pettigrew, S.; Scott, M.; et al. From Nutrients to Nurturance: A Conceptual Introduction to Food Well-Being. J. Public Policy Mark. 2011, 30, 5–13.

Bortoli, M. De; Maroto, J. Colours Across Cultures: Translating Colours in Interactive Marketing Communications. In Proceedings of the Elicit 2001: Proceedings of the European Languages and the Implementation of Communication and Information Technologies (Elicit) conference; UK: Paisley University Language Press, 2001; pp. 3–4.

Bourn, D.; Prescott, J. A comparison of the nutritional value, sensory qualities, and food safety of organically and conventionally produced foods. Crit. Rev. Food Sci. Nutr. 2002, 42, 1–34.

Boyatzis, C.J.; Varghese, R. Children's emotional associations with colours. J. Genet. Psychol. 1994, 155, 77–85.

Bryła, P. Organic food consumption in Poland: Motives and barriers. Appetite 2016, 105, 737–746.

Bublitz, M.G.; Peracchio, L.A.; Andreasen, A.R.; Kees, J.; Kidwell, B.; Miller, E.G.; Motley, C.M.; Peter, P.C.; Rajagopal, P.; Scott, M.L.; et al. Promoting positive change: Advancing the food well-being paradigm. J. Bus. Res. 2013, 66, 1211–1218.

Buder, F.; Feldmann, C.; Hamm, U. Why regular buyers of organic food still buy many conventional products: Product-specific purchase barriers for organic food consumers. Br. Food J. 2014, 116, 390–404.

C

C. Gan, C. Zhiyou, M.C. Tran, D. A. Cohen, W.X. Consumer attitudes towards the purchase of organic products in China; 2014; Vol. 15;.

Calvo, M.G.; Lang, P.J. Gaze Patterns When Looking at Emotional Pictures: Motivationally Biased Attention. Motiv. Emot. 2004, 28, 221–243.

Cardello, A. V.; Meiselman, H.L.; Schutz, H.G.; Craig, C.; Given, Z.; Lesher, L.L.; Eicher, S. Measuring emotional responses to foods and food names using questionnaires. Food Qual. Prefer. 2012, 24, 243–250.

Carrington, M.J.; Neville, B.A.; Whitwell, G.J. Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. J. Bus. Ethics 2010, 97, 139–158.

Chekima, B.; Oswald, A.I.; Wafa, S.A.W.S.K.; Chekima, K. Narrowing the gap: Factors driving organic food consumption. J. Clean. Prod. 2017, 166, 1438–1447.

Chrea, C.; Grandjean, D.; Delplanque, S.; Cayeux, I.; Le Calvé, B.; Aymard, L.; Velazco, M.I.; Sander, D.; Scherer, K.R. Mapping the Semantic Space for the Subjective Experience of Emotional Responses to Odors. Chem. Senses 2008, 34, 49–62.

Cimbalo, R.S.; Beck, K.L.; Sendziak, D.S. Emotionally toned pictures and colour selection for children and college students. J. Genet. Psychol. 1978, 133.2, 303–304.

Clugston, R.; Calder, W. Food and Higher Education for Sustainable Development. J. Educ. Sustain. Dev. 2007, 1, 209–218.

Cochran, W.G. Sampling Techniques, 2nd ed.; John Wiley and Sons, Inc.: New York, NY, USA, 1963.

Collinsworth, L.A.; Lammert, A.M.; Martinez, K.P.; Leidheiser, M.; Garza, J.; Keener, M.; Ashman, H. Development of a novel sensory method: Image Measurement of Emotion and Texture (IMET). Food Qual. Prefer. 2014, 38, 115–125.

D

Dael, N.; Perseguers, M.N.; Marchand, C.; Antonietti, J.P.; Mohr, C. Put on that colour, it fits your emotion: Colour appropriateness as a function of expressed emotion. Q. J. Exp. Psychol. 2016, 69, 1619–1630.

Dalenberg, J.R.; Gutjar, S.; Ter Horst, G.J.; De Graaf, K.; Renken, R.J.; Jager, G. Evoked emotions predict food choice. PLoS One 2014, 9, 1–16.

Dane, E.; Pratt, M.G. Exploring Intuition and its Role in Managerial Decision Making. Acad. Manag. Rev. 2007, 32, 33–54.

Dangour, A.D.; Lock, K.; Hayter, A.; Aikenhead, A.; Allen, E.; Uauy, R. Nutrition-related health effects of organic foods: A systematic review. Am. J. Clin. Nutr. 2010, 92, 203–210.

Danner, L.; Sidorkina, L.; Joechl, M.; Duerrschmid, K. Make a face! Implicit and explicit measurement of facial expressions elicited by orange juices using face reading technology. Food Qual. Prefer. 2014, 32, 167–172.

De Bortoli, M.; Maroto, J. Colours across cultures: Translating colours in interactive marketing communications. Elicit 2001: Proceedings of the European Languages and the Implementation of Communication and Information Technologies (Elicit) Conference, Paisley, UK, November 2001; pp. 3–4.

De Houwer, J., & Moors, A. How to define and examine implicit processes? In Psychology of science: Implicit and explicit processes; R. Proctor & E. J. Capaldi (Eds.), Ed.; Oxford: Oxford University Press, 2012; pp. 183–198.

Dean, M.; Raats, M.M.; Shepherd, R. Moral concerns and consumer choice of fresh and processed organic foods. J. Appl. Soc. Psychol. 2008, 38, 2088–2107.

Delarue, J.; Lawlor, B.; Rogeaux, M. Rapid Sensory Profiling Techniques: Applications in New Product Development and Consumer Research; Woodhead Publishing: Cambridge, UK, 2014; pp. 71–100.

Desmet, P. Development and application of an instrument to measure emotional responses to products. Funology. Springer, Dordrecht, 2003, 111–123.

Desmet, P.M.A.; Schifferstein, H.N.J. Sources of positive and negative emotions in food experience. Appetite 2008, 50, 290–301.

Diane M. Phillips How Does It Make Me Feel? J. Food Prod. Mark. 2000, 6, 15–33.

Díaz, F.J.M.; Pleite, F.M.C.; Paz, J.M.M.; García, P.G. Consumer knowledge, consumption, and willingness to pay for organic tomatoes. Br. Food J. 2012, 114, 318–334.

Diener, E.; Emmons, R.A.; Larsen, R.J. The Satisfaction With Life Scale. J. Pers. Assess. 1985, 49, 71–75.

Diener, E. New findings and future directions for subjective well-being research. Am. Psychol. 2012, 67, 590.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. New Measures of Well-Being; E., D., Ed.; Springer: Dordrecht, 2009; Vol. 39; ISBN 9048123496.

Diener, E.; Oishi, S.; Lucas, R.E. Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. Annu. Rev. Psychol. 2003, 54, 403–425.

Diener, E.; Ryan, K. Subjective well-being : A general overview. S. Afr. J. Psychol. 2009, 39, 391–406.

Diener, E.; Scollon, C.N.; Lucas, R.E. Assessing Well-Being; Springer Netherlands: Dordrecht, 2009;

Diener, E.; Wirtz, D.; Tov, W.; Kim-Prieto, C.; Choi, D. won; Oishi, S.; Biswas-Diener, R. New well-being measures: Short scales to assess flourishing and positive and negative feelings. Soc. Indic. Res. 2010, 97, 143–156.

Diener, E.; Wirtz, D.; Tov, W.; Kim-Prieto, C.; Choi, D.; Oishi, S.; Biswas-Diener, R. New Measures of Well-Being. Springer: Dordrecht, The Netherlands, 2009; Volume 39, ISBN 9048123496.

Dijksterhuis, A.; Nordgren, L.F. A Theory of Unconscious Thought. 2006, 1, 95–109.
Dijksterhuis, A.; Spears, R.; Postmes, T.; Stapel, D.; Koomen, W.; Knippenberg, A. van; Scheepers, D. Seeing one thing and doing another: Contrast effects in automatic behaviour. J. Pers. Soc. Psychol. 1998, 75, 862–871.
DIN 10974 Sensorische Analyse Verbrauchertests (Sensory Analyses Consumer Sensory Evaluation); Beuth: Berlin, Germany, 2008.
Dodge, R.; Daly, A.; Huyton, J.; Sanders, L. The challenge of defining wellbeing. Int. J. Wellbeing 2013, 2, 222–235.
Dooris, M.; Farrier, A.; Froggett, L. Wellbeing: the challenge of 'operationalising' an holistic concept within a reductionist public health programme. Perspect. Public Health 2017, 138, 93–99.
Drewnowski, A.; Mennella, J.A.; Johnson, S.L.; Bellisle, F. Sweetness and Food Preference. J. Nutr. 2012, 142, 1142–1148.
Du, S.; Bartels, J.; Reinders, M.; Sen, S. Organic consumption behaviour: A social identification perspective. Food Qual. Prefer. 2017, 62, 190–198.
Dürrschmid, K. Psychologie und lebensmittelsensorik. J. fur Ernahrungsmedizin 2008, 10, 15–19.

E

Ellison, B.; Duff, B.R.L.; Wang, Z.; White, T.B. Putting the organic label in context: Examining the interactions between the organic label, product type, and retail outlet. Food Qual. Prefer. 2016, 49, 140–150.
Escadas, M.; Jalali, M.S.; Farhangmehr, M. What goes around comes around: The integrated role of emotions on consumer ethical decision-making. J. Consum. Behav. 2020, 1–14.
European Commission Farm to Fork Strategy For a fair, healthy and environmentally-friendly food system; 2020. Retrieved from: https://ec.europa.eu/food/farm2fork_en (accessed on 27/07/2020).

F

Feulner, G. Global Challenges: Climate Change. Glob. Challenges 2017, 1, 5–6.
Fink, L.L.; Ploeger, A.; Strassner, C. Sustainable diets : Studies on German consumers ' intention-behaviour gap, 2020.
Fishbein, Martin, and I.A. Belief, attitude, intention, and behaviour: An introduction to theory and research. Reading, MA Addison-Wesley. 1977.
Foti, D.; Hajcak, G.; Dien, J. Differentiating neural responses to emotional pictures: Evidence from temporal-spatial PCA. Psychophysiology. 2009, 46, 521–530.
Frank, M.; Andrews, S.B.W. Social Indicators of Well-Being: Americans' Perceptions of Life Quality; Springer Science & Business Media: Berlin/Heidelberg, Germany, 2012.
Fraser, T.; Banks, A. Designer's colour manual: The complete guide to colour theory and application; Chronicle Books, 2004;
Friese, M.; Basel, M.W.; Plessner, H. Implicit Consumer Preferences and Their Influence on Product Choice. Psychol. Mark. 2006, 23, 727–740.

G

Gao, X.P.; Xin, J.H.; Sato, T.; Hansuebsai, A.; Scalzo, M.; Kajiwara, K.; Guan, S.S.; Valldeperas, J.; Lis, M.J.; Billger, M. Analysis of cross-cultural colour emotion. Colour Res. Appl. 2007, 32, 223–229.
Geier, U.; Büssing, A.; Kruse, P.; Greiner, R.; Buchecker, K. Development and application of a test for food-induced emotions. PLoS One 2016, 11, 1–17.
Geier, U.; Hermann, I.; Mittag, K.; Buchecker, K. First steps in the development of a psychological test on the effects of food on mental well-being. J. Sci. Food Agric. 2012, 92, 2753–2756.

Gil, S.; Bigot, L. Le SHORT REPORT Colour and emotion: children also associate red with negative valence. 2016, 6, 1087–1094.
Gil, S.; Le Bigot, L. Seeing life through positive-tinted glasses: Colour-meaning associations. PLoS One 2014, 9.
Gilbert, A.N.; Fridlund, A.J.; Lucchina, L.A. The colour of emotion: A metric for implicit colour associations. Food Qual. Prefer. 2016, 52, 203–210.
Gilg, A.; Barr, S.; Ford, N. Green consumption or sustainable lifestyles? Identifying the sustainable consumer. Futures 2005, 37, 481–504.
Gmuer, A.; Nuessli Guth, J.; Runte, M.; Siegrist, M. From emotion to language: Application of a systematic, linguistic-based approach to design a food-associated emotion lexicon German. Food Qual. Prefer. 2015, 40, 77–86.
Goetzke, B.; Nitzko, S.; Spiller, A. Consumption of organic and functional food. A matter of well-being and health? Appetite 2014, 77, 96–105.
Gottschalk, I.; Leistner, T. Consumer reactions to the availability of organic food in discount supermarkets. 2013, 37, 136–142.
Greenwald, A.G. What cognitive representations underlie social attitudes? Bull. Psychon. Soc. 1990, 28, 254–260.
Greenwald, A.G.; McGhee, D.E.; Schwartz, J.L. Measuring individual differences in implicit cognition: the implicit association test. J. Pers. Soc. Psychol. 1998, 74, 1464–80.
Greenwald, A.G.; Nosek, B.A. Attitudinal Dissociation: What Does it Mean? In Attitudes: Insights from the New Implicit Measures; Psychology Press., 2008; pp. 85–102.
Greenwald, A.G.; Poehlman, T.A.; Uhlmann, E.L.; Banaji, M.R. Understanding and Using the Implicit Association Test: III. Meta-Analysis of Predictive Validity. J. Pers. Soc. Psychol. 2009, 97, 17–41.
Grunert, K.G.; Dean, M.; Raats, M.M.; Nielsen, N.A.; Lumbers, M. A measure of satisfaction with food-related life. Appetite 2007, 49, 486–493.
Guillemin, I. ; Marrel, A. ; Arnould, B. ; Capuron, L. ; Dupuy, A. ; Ginon, E. ; Layé, S. ; Lecerf, J.M. ; Prost, M. ; Rogeaux, M. ; et al. How French subjects describe well-being from food and eating habits? Development, item reduction and scoring definition of the Well-Being related to Food Questionnaire (Well-BFQ©). Appetite 2016, 96, 333–346.
Gut jar, S.; Dalenberg, J.R.; de Graaf, C.; de Wijk, R.A.; Palascha, A.; Renken, R.J.; Jager, G. What reported food-evoked emotions may add: A model to predict consumer food choice. Food Qual. Prefer. 2015, 45, 140–148.

H

Hamm, U.; Hemmerling, S.; Schleenbecker, R.; Spiller, A.; Wägeli, S.; Cordts, A.; Hermann, I.; Sonntag, I.; Kary, V. Consumer Purchase and Consumption Behaviour Regarding Organic Food—Analysis of the State of the Art. BÖLN Bericht 20055, University of Kassel and University of Göttingen. 2012, p. 119.
Hanada, M. Correspondence analysis of colour–emotion associations. Colour Res. Appl. 2018, 43, 224–237.
Hashmi, U.; Huong, N.T.; Wee, C.S. Key Factors Affecting Consumer Purchase Intention a Study of Safe Vegetable in Ho Chi Minh City, Vietnam. Univ. Econ. Ho Chi Minh City Int. Sch. Bus. 2012, 1, 1–68.
Haybron, D.M. Philosophy and the science of subjective well-being; 2008; ISBN 9780191562914.
Hemphill, M. A note on adults' colour–emotion associations. J. Genet. Psychol. 1996, 157, 275–280.
Hettiarachchi, A.A.; De Silva, N. Colour associated emotional and behavioural responses: A study on the associations emerged via imagination. Built Environ. Sri Lanka 2012, 11, 21–27.
Hettler, B. Wellness: Encouraging a lifetime pursuit of excellence. Health Values 1984, 8, 13–17.

Hupka, R.B.; Zaleski, Z.; Otto, J.; Reidl, L.; Tarabrina, N.V. The colours of anger, envy, fear, and jealousy: A cross-cultural study. J. Cross Cult. Psychol. 1997, 28, 156–171.

I

Ismael, D.; Angelika, P. Consumers' Emotion Attitudes towards Organic and Conventional Food : A Comparison Study of Emotional Profiling and Self-Reported Method. Foods 2020, 9, 79.

Ismael, D.; Ploeger, A. Development of a Sensory Method to Detect Food-Elicited Emotions Using Emotion-Colour Association and Eye-Tracking. Foods 2019, 8, 217.

ISO 11136 Sensory analysis Methodology. General Guidance for Conducting Hedonic Tests with Consumers in a Controlled Area; ISO: Geneva, Switzerland, 2014.

ISO 13299 Sensory analysis Methodology. General Guidance for establishing a sensory profile; ISO: Geneva, Switzerland; ISO: Geneva, Switzerland, 2016

J

Jaeger, S.R.; Lee, S.M.; Kim, K.-O.O.; Chheang, S.L.; Jin, D.; Ares, G. Measurement of product emotions using emoji surveys: Case studies with tasted foods and beverages. Food Qual. Prefer. 2017, 62, 46–59.

Jallinoja, P.; Niva, M.; Helakorpi, S.; Kahma, N. Food choices, perceptions of healthiness, and eating motives of self-identified followers of a low-carbohydrate diet. Food Nutr. Res. 2014, 58, 23552.

Jiang, Y.; King, J.M.M.; Prinyawiwatkul, W. A review of measurement and relationships between food, eating behaviour and emotion. Trends Food Sci. Technol. 2014, 36, 15–28.

Johansson, L.; Haglund, Å.; Berglund, L.; Lea, P.; Risvik, E. Preference for tomatoes, affected by sensory attributes and information about growth conditions. Food Qual. Prefer. 1999, 10, 289–298.

Josephine, P.; Ritsuko, O. Pro-environmental products: marketing influence on consumer purchase decision. J. Consum. Mark. 2008, 25, 281–293.

Joshi, Y.; Rahman, Z. Investigating the determinants of consumers' sustainable purchase behaviour. Sustain. Prod. Consum. 2017, 10, 110–120.

Justin, P.; Jyoti, R. Consumer behaviour and purchase intention for organic food. J. Consum. Mark. 2012, 29, 412–422.

K

Kapuge, K.D.L.R. Determinants of Organic Food Buying Behaviour: Special Reference to Organic Food Purchase Intention of Sri Lankan Customers. Procedia Food Sci. 2016, 6, 303–308.

Kaya, N.; Crosby, M. Colour associations with different building types: An experimental study on American college students. Colour Res. Appl. 2006, 31, 67–71.

Kaya, N.; Epps, H.H. Colour-Emotion Associations: Past Experience and Personal Preference. In Proceedings of the AIC 2004 Colour and Paints, Interim Meeting of the International Colour Association; Brazil, 2004; Vol. 5, pp. 31–34.

Kaya, N.; Epps, H.H. Relationship between Colour and Emotion: A Study of College Students. Coll. Stud. J. 2004, 38, 396–405.

Kaya, N.; Epps, H.H.; Hall, D. RELATIONSHIP BETWEEN COLOUR AND EMOTION: A STUDY OF COLLEGE STUDENTS. Coll. Student J 1998, 38, 396–406.

Kinderman, P.; Schwannauer, M.; Pontin, E.; Tai, S. The development and validation of a general measure of well-being: The BBC well-being scale. Qual. Life Res. 2011, 20, 1035–1042.

King, S. C., Sainsbury, J., Meiselman, H. L., Snow, J., Gillette, M., McCafferty, D. Measuring the wellness in ‘‘‘health and wellness’’’. In 5th European conference on sensory and consumer research, 9–12 September 2012.; Bern, Switzerland, 2012.

King, S.C.; Meiselman, H.L. Development of a method to measure consumer emotions associated with foods. Food Qual. Prefer. 2010, 21, 168–177.

King, S.C.; Meiselman, H.L.; Carr, B.T. Measuring emotions associated with foods in consumer testing. Food Qual. Prefer. 2010, 21, 1114–1116.

King, S.C.; Sainsbury, J.; Meiselman, H.L.; Snow, J.; Gillette, M.; McCafferty, D. Measuring the wellness in “health and wellness”. In Proceedings of the 5th European Conference on Sensory and Consumer Research, Bern, Switzerland, 9–12 September 2012.

King, S.C.; Snow, J.; Meiselman, H.L.; Sainsbury, J.; Carr, B.T.; McCafferty, D.; Serrano, D.; Gillette, M.; Millard, L.; Li, Q. Development of a questionnaire to measure consumer wellness associated with foods: The WellSense ProfileTM. Food Qual. Prefer. 2015, 39, 82–94.

Klauer, K.C.; Musch, J. Affective priming: Findings and theories. The psychology of evaluation: Affective processes in cognition and emotion. Psychol. Press. 2003 2003, 432.

Koola, P.M.; Benjamin, P.; Schatz, S.; Colombo, G. A Methodology for Capturing and Fusing Unconscious Cognition with Computation. Procedia Manuf. 2015, 3, 4129–4135.

Kostyra, E.; Wasiak-Zys, G.; Rambuszek, M.; Waszkiewicz-Robak, B. Determining the sensory characteristics, associated emotions and degree of liking of the visual attributes of smoked ham. A multifaceted study. LWT - Food Sci. Technol. 2016, 65, 246–253.

Kourouniotis, S.; Keast, R.S.J.; Riddell, L.J.; Lacy, K.; Thorpe, M.G.; Cicerale, S. The importance of taste on dietary choice, behaviour and intake in a group of young adults. Appetite 2016, 103, 1–7.

Krishna, A.; Cian, L.; Sokolova, T. The power of sensory marketing in advertising. Curr. Opin. Psychol. 2016, 10, 142–147.

Kwallek, N.; Lewis, C.M.; Lin-Hsiao, J.W.D.; Woodson, H. Effects of nine monochromatic office interior colours on clerical tasks and worker mood. Colour Res. Appl. 1996, 21, 448–458.

Kühn, S.; Brass, M. Retrospective construction of the judgement of free choice. Conscious. Cogn. 2009, 18, 12–21.

Köster, E.P. Diversity in the determinants of food choice: A psychological perspective. Food Qual. Prefer. 2009, 20, 70–82.

Köster, E.P.; Mojet, J. From mood to food and from food to mood: A psychological perspective on the measurement of food-related emotions in consumer research. Food Res. Int. 2015, 76, 180–191.

L

Lagast, S.; Gellynck, X.; Schouteten, J.J.; De Herdt, V.; De Steur, H. Consumers’ emotions elicited by food: A systematic review of explicit and implicit methods. Trends Food Sci. Technol. 2017, 69, 172–189.

Lang, P.J.; Greenwald, M.K.; Bradley, M.M.; Hamm, A.O. Looking at pictures: Affective, facial, visceral, and behavioural reactions. Psychophysiology. 1993, 30, 261–273.

Laros, F.J.M.; Steenkamp, J.B.E.M. Emotions in consumer behaviour: A hierarchical approach. J. Bus. Res. 2005, 58, 1437–1445.

Lassiter, G.D.; Bellezza, F.; Phillips, N.; Harman, J.; Chimeli, J.; González Vallejo, C.; Lindberg, M.J.; Cheng, J. Early Positive Information Impacts Final Evaluations: No Deliberation-Without-Attention Effect and a Test of a Dynamic Judgment Model. J. Behav. Decis. Mak. 2013, 27, 209–225.

Lawler, C.O.; Lawler III EE Colour-mood associations in young children. J. Genet. Psychol. 1965, 107, 29–32.

Lee, H.J. Does consumption of organic foods contribute to Korean consumers' subjective wellbeing? Sustainability 2019, 11, 5496.

Leeuw, E.D.D.; Joop Hox, D.D. International Handbook of Survey Methodology; Routledge: Abingdon, UK, 2008.

Leitch, K.A.; Duncan, S.E.; O'Keefe, S.; Rudd, R.; Gallagher, D.L. Characterizing consumer emotional response to sweeteners using an emotion terminology questionnaire and facial expression analysis. Food Res. Int. 2015, 76, 283–292.

Lin, Y.-H.; Chen, C.-F. Passengers' shopping motivations and commercial activities at airports—The moderating effects of time pressure and impulse buying tendency. Tour. Manag. 2013, 36, 426–434.

Lockie, S.; Lyons, K.; Lawrence, G.; Grice, J. Choosing organics: A path analysis of factors underlying the selection of organic food among Australian consumers. Appetite 2004, 43, 135–146.

M

Macht, M. How emotions affect eating: A five-way model. Appetite 2008, 50, 1–11.

Magnusson, M.K.; Arvola, A.; Hursti, U.K.K.; Åberg, L.; Sjödén, P.O. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. Appetite 2003, 40, 109–117.

Mahnke, F.H. Colour, Environment, and Human Response: An Interdisciplinary Understanding of Colour and Its Use as A Beneficial Element in The Design of The Architectural Environment; Wiley: Seoul, Korea, 1996.

Manav, B. Colour-emotion associations and colour preferences: A case study for residences. Colour Res. Appl. 2007, 32, 144–150.

Manav, B. Colour-emotion associations, designing colour schemes for urban environment-architectural settings. Colour Res. Appl. 2017, 42, 631–640.

Manolis, C.; Roberts, J.A. Subjective Well-being among Adolescent Consumers: The Effects of Materialism, Compulsive Buying, and Time Affluence. Appl. Res. Qual. Life 2012, 7, 117–135.

Manuela Vega-Zamora, Francisco Jos´e Torres-Ruiz, Eva Ma Murgado-Armenteros, and M.P.-R. Organic as a Heuristic Cue: What Spanish Consumers Mean by Organic Foods. Psychol. Mark. 2014, 31, 349–359.

Massey, M.; O'Cass, A.; Otahal, P. A meta-analytic study of the factors driving the purchase of organic food. Appetite 2018, 125, 418–427.

Mauss, I.B.; Robinson, M.D. Measures of emotion: A review. Cogn. Emot. 2009, 23, 209–237.

McMahon, A.T.; Williams, P.; Tapsell, L. Reviewing the meanings of wellness and well-being and their implications for food choice. Perspect. Public Health 2010, 130, 282–286.

Mcgillivray, M.; Clarke, M. Human well-being : Concepts and measures. United Nations Univ. Press. New York, NY., 2006, pp.3-16.

Meiselman, H.L. A review of the current state of emotion research in product development. Food Res. Int. 2015, 76, 192–199.

Meiselman, H.L. Emotion Measurement; Meiselman, H.L.B.T.-E.M., Ed.; Woodhead Publishing, 2016; ISBN 978-0-08-100508-8.

Meiselman, H.L. Quality of life, well-being and wellness: Measuring subjective health for foods and other products. Food Qual. Prefer. 2016, 54, 101–109.

Meiselman, H.L. The future in sensory/consumer research: Evolving to a better science. Food Qual. Prefer. 2013, 27, 208–214.

Meyners, M.; Castura, J.C.; Carr, B.T. Existing and new approaches for the analysis of CATA data. Food Qual. Prefer. 2013, 30, 309–319.

Millock, K.; Hansen, L.G. Willingness to Pay for Organic Foods: A Comparison between Survey Data and Panel Data from Denmark. Munich Personal RePEc Archive, Munchin, Germany. 2002.

Mojet, J.; Dürrschmid, K.; Danner, L.; Jöchl, M.; Heiniö, R.L.; Holthuysen, N.; Köster, E. Are implicit emotion measurements evoked by food unrelated to liking? Food Res. Int. 2015, 76, 224–232.

Montaño, Z., Smith, J. D., Dishion, T. J., Shaw, D. S., & Wilson, M.N. Longitudinal Relations Between Observed Parenting Behaviours and Dietary Quality of Meals from Ages 2 to 5. Appetite 2015, 87, 1324–329.

Moore, D.J.; Konrath, S. "I can almost taste it:" Why people with strong positive emotions experience higher levels of food craving, salivation and eating intentions. J. Consum. Psychol. 2015.

Moser, A.K. Consumers' purchasing decisions regarding environmentally friendly products: An empirical analysis of German consumers. J. Retail. Consum. Serv. 2016, 31, 389–397.

Moser, A.K. Thinking green, buying green? Drivers of pro-environmental purchasing behaviour. J. Consum. Mark. 2015, 32, 167–175.

N

Nestrud, M.A.; Meiselman, H.L.; King, S.C.; Lesher, L.L.; Cardello, A. V. Development of EsSense25, a shorter version of the EsSense Profile®. Food Qual. Prefer. 2016, 48, 107–117.

Newell, B.R.; Shanks, D.R. Unconscious influences on decision making. 2012, 1–72.

Ng, M.; Chaya, C.; Hort, J. Beyond liking: Comparing the measurement of emotional response using EsSense Profile and consumer defined check-all-that-apply methodologies. Food Qual. Prefer. 2013, 28, 193–205.

Nikodemska-Wolowik, A.M. Organic farming brand identity: meeting trends, building trust. Pecvnia Rev. la Fac. Ciencias Económicas y Empres. Univ. León 2009, 8, 263.

Nilsson, E.; Gärling, T.; Marell, A. Effects of time pressure, type of shopping, and store attributes on consumers' satisfaction with grocery shopping. Int. Rev. Retail. Distrib. Consum. Res. 2017, 27, 334–351.

Nuttavuthisit, K.; Thøgersen, J. The Importance of Consumer Trust for the Emergence of a Market for Green Products: The Case of Organic Food. J. Bus. Ethics 2017, 140, 323–337.

O

OECD How's Life? Measuring well-being, OECD Publishing, 2019. Retrieved from: http://www.oecd.org/statistics/how-s-life-23089679.htm (accessed on 27.07.2020)

Olofsson, J.K.; Nordin, S.; Sequeira, H.; Polich, J. Affective picture processing: An integrative review of ERP findings. Biol. Psychol. 2008, 77, 247–265.

Organization World Health Global status report on noncommunicable diseases; Geneva, Switzerland, 2014;

Ou, L.C.; Luo, M.R.; Woodcock, A.; Wright, A. A study of colour emotion and colour preference. Part III: Colour preference modelling. Colour Res. Appl. 2004, 29, 381–389.

P

Padel, S.; Foster, C. Exploring the gap between attitudes and behaviour Understanding why consumers buy or do not buy organic food. Br. Food J. 2005, 107, 606–625.

Padilla Bravo, C.; Cordts, A.; Schulze, B.; Spiller, A. Assessing determinants of organic food consumption using data from the German National Nutrition Survey II. Food Qual. Prefer. 2013, 28, 60–70.

Pearson, D.; Henryks, J.; Jones, H. Organic food: What we know (and do not know) about consumers. Renew. Agric. Food Syst. 2011, 26, 171–177.

Perrini, F.; Castaldo, S.; Misani, N.; Tencati, A. a Study of Italian Consumers. Bus. Strateg. Environ. 2010, 526, 512–526.

Petrescu, D.C.; Petrescu-Mag, R.M.; Burny, P.; Azadi, H. A new wave in Romania: Organic food. Consumers' motivations, perceptions, and habits. Agroecol. Sustain. Food Syst. 2017, 41, 46–75.

Pham, T.H.; Nguyen, T.N.; Phan, T.T.H.; Nguyen, N.T. Evaluating the purchase behaviour of organic food by young consumers in an emerging market economy. J. Strateg. Mark. 2019, 27, 540–556.

Piotrowski, C.; Armstrong, T. Colour Red: Implications for applied psychology and marketing research. Psychol. Educ. 2012, 49, 55–57.

Piqueras Fiszman, B.; Jaeger, S.R. The effect of product–context appropriateness on emotion associations in evoked eating occasions. Food Qual. Prefer. 2015, 40, 49–60.

Piqueras-Fiszman, B.; Giboreau, A.; Spence, C. Assessing the influence of the colour of the plate on the perception of a complex food in a restaurant setting. Flavour 2013, 2, 1–11.

Piqueras-Fiszman, B.; Jaeger, S.R. Emotion responses under evoked consumption contexts: A focus on the consumers' frequency of product consumption and the stability of responses. Food Qual. Prefer. 2014, 35, 24–31.

Porcherot, C.; Delplanque, S.; Planchais, A.; Gaudreau, N.; Accolla, R.; Cayeux, I. Influence of food odorant names on the verbal measurement of emotions. Food Qual. Prefer. 2012, 23, 125–133.

Porcherot, C.; Delplanque, S.; Raviot-Derrien, S.; Calvé, B.L.; Chrea, C.; Gaudreau, N.; Cayeux, I. How do you feel when you smell this? Optimization of a verbal measurement of odor-elicited emotions. Food Qual. Prefer. 2010, 21, 938–947.

Q

Qasim, H.; Yan, L.; Guo, R.; Saeed, A.; Ashraf, B.N. The defining role of environmental self-identity among consumption values and behavioural intention to consume organic food. Int. J. Environ. Res. Public Health 2019, 16.

R

Rana, J.; Paul, J. Consumer behaviour and purchase intention for organic food: A review and research agenda. J. Retail. Consum. Serv. 2017, 38, 157–165.

Richins, M.L. Measuring Emotions in the Consumption Experience. J. Consum. Res. 1997, 24, 127–146.

Rizzato, M. How Emotions and Social Interaction Affect Our Food Experience. University of Udine, Udine, Italy, 2016.

Rong-Da, L. Predicting intentions to purchase organic food: the moderating effects of organic food prices. Br. Food J. 2016, 118, 183–199.

Roscoe, L.J. Wellness: A review of theory and measurement for counsellors. J. Couns. Dev. 2009, 87, 216–226.

Royet, J.P.; Zald, D.; Versace, R.; Costes, N.; Lavenne, F.; Koenig, O.; Gervais, R. Emotional Responses to Pleasant and Unpleasant Olfactory, Visual, and Auditory Stimuli: A Positron Emission Tomography Study. J. Neurosci. 2000, 20, 7752–7759.

Ryff, C.D.; Keyes, C.L.M. The Structure of Psychological Well-Being Revisited. J. Personal. Soc. Psychol. 1995, 69, 719–727.

S

Sachs, M.E.; Damasio, A.; Habibi, A. تمعقتبولسيقى The pleasures of sad music: a systematic review. Front. Hum. Neurosci. 2015, 9, 1–12.

Salleh, M.M.; Ali, S.M.; Harun, E.H.; Jalil, M.A.; Shaharudin, M.R. Consumer's Perception and Purchase Intentions towards Organic Food Products. Can. Soc. Sci. 2010, 6, 119–129.

Savarese, M.; Chamberlain, K.; Graffgna, G. Co-creating value in sustainable and alternative food networks: The case of community supported agriculture in New Zealand. Sustain. 2020, 12.

Saito, M. A cross-cultural study on colour preference in three Asian cities. Jpn. Psychol. Res. 1994, 36, 219–232.

Saito, M. A comparative study of colour preferences in Japan, China and Indonesia, with emphasis on the preference for white. Percept. Mot. Skills 1996, 83, 115–128.

Schaack, Diana, and H.W. The World of Organic Agriculture. In Proceedings of the world of organic agriculture–Statistics and emerging trends; Bonn: IFOAM, Frick: FIB, 2010; pp. 141–144.

Schmidt, V.; Schaefer, H.M. Unlearned preference for red may facilitate recognition of palatable food in young omnivorous birds. Evol. Ecol. Res. 2004, 6, 919–925.

Schnettler, B.; Miranda, H.; Sepúlveda, J.; Denegri, M.; Mora, M.; Lobos, G.; Grunert, K.G. Psychometric properties of the satisfaction with food-related life scale: Application in Southern Chile. J. Nutr. Educ. Behav. 2013, 45, 443–449.

Schouteten, J.J.; de Steur, H.; de Pelsmaeker, S.; Lagast, S.; de Bourdeaudhuij, I.; Gellynck, X. Impact of health labels on flavour perception and emotional profiling: A consumer study on cheese. Nutrients 2015, 7, 10251–10268.

Schouteten, J.J.; De Steur, H.; Sas, B.; De Bourdeaudhuij, I.; Gellynck, X. The effect of the research setting on the emotional and sensory profiling under blind, expected, and informed conditions: A study on premium and private label yogurt products. J. Dairy Sci. 2017, 100, 169–186.

Schwepker, C.H.; Cornwell, T.B. An Examination of Ecologically Concerned Consumers and Their Intention to Purchase Ecologically Packaged Products. J. Public Policy Mark. 1991, 10, 77–101.

Seppänen, L. Local and organic food and farming around the Baltic Sea; Sveriges lantbruksuniv, 2004; ISBN 9157666369.

Siedlecki, K.L.; Salthouse, T.A.; Oishi, S.; Jeswani, S. The Relationship Between Social Support and Subjective Well-Being Across Age. Soc. Indic. Res. 2014, 117, 561–576

Simões-Wüst, A. P., Moltó-Puigmartí, C., Jansen, E. H., van Dongen, M. C., Dagnelie, P. C., & Thijs, C. Organic food consumption during pregnancy and its association with health-related characteristics: the KOALA Birth Cohort Study. Public Health Nutr. 2017, 20, 2145-2156.

Singh, A.; Verma, P. Factors influencing Indian consumers' actual buying behaviour towards organic food products. J. Clean. Prod. 2017, 167, 473–483.

Sniehotta, F.F.; Scholz, U.; Schwarzer, R. Bridging the intention – behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. Psychol. & Heal. 2005, 20, 143–160.

Spence, C.; Levitan, C.A.; Shankar, M.U.; Zampini, M. Does food colour influence taste and flavour perception in humans? Chemosens. Percept. 2010, 3, 68–84.

Spence, C.; Spence, C.; Velasco, C. On the multiple effects of packaging colour on consumer behaviour and product experience in the 'food and beverage' and 'home and personal care' categories. *Food Qual. Prefer.* 2018, 68, 226–237.

Spinelli, S.; Masi, C.; Dinnella, C.; Zoboli, G.P.; Monteleone, E. How does it make you feel? A new approach to measuring emotions in food product experience. Food Qual. Prefer. 2014, 37, 109–122.

Spinelli, S.; Masi, C.; Zoboli, G.P.; Prescott, J.; Monteleone, E. Emotional responses to branded and unbranded foods. Food Qual. Prefer. 2015, 42, 1–11.

Srednicka-Tober, D.; Barański, M.; Seal, C.; Sanderson, R.; Benbrook, C.; Steinshamn, H.; Gromadzka-Ostrowska, J.; Rembiałkowska, E.; Skwarło-Sońta, K.; Eyre, M.; et al. Composition differences between organic and conventional meat: A systematic literature review and meta-analysis. Br. J. Nutr. 2016, 115, 994–1011.

Steenkamp, Jan-Benedict EM, M.G.D.J.; Baumgartner., H. Socially Desirable Response Tendencies in Survey Research. J. Mark. Res. 2010, 47, 199–214.

Steptoe, A.; Pollard, T.M.; Wardle, J. Development of a Measure of the Motives Underlying the Selection of Food: The Food Choice Questionnaire. Appetite 2013, 25, 267–284.

Sultan, P.; Tarafder, T.; Pearson, D.; Henryks, J. Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: moderating roles of communication, satisfaction and trust in organic food consumption. Food Qual. Prefer. 2020, 81, 103838.

Sutton, T.M.; Altarriba, J. Colour associations to emotion and emotion-laden words: A collection of norms for stimulus construction and selection. Behav. Res. Methods 2016.

Sylwia, Ż. Polish consumer food choices and beliefs about organic food. Br. Food J. 2011, 113, 122–137.

Sørensen, J. Measuring Emotions in a Consumer decision-making Context – Approaching or Avoiding by Approaching or Avoiding; 2008; ISBN 9788791646249.

T

Terlau, W.; Hirsch, D. Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon-Causes and Measurements towards a Sustainable Development. Int. J. Food Syst. Dyn. 2015, 6, 159–174.

Thompson, E.R. Development and Validation of an Internationally Reliable Short-Form of the Positive and Negative Affect Schedule (PANAS). J. Cross Cult. Psychol. 2007, 38, 227–242.

Thomson, D.M.H.; Crocker, C.; Marketo, C.G. Linking sensory characteristics to emotions: An example using dark chocolate. Food Qual. Prefer. 2010, 21, 1117–1125.

Thøgersen, J.; de Barcellos, M.D.; Perin, M.G.; Zhou, Y. Consumer buying motives and attitudes towards organic food in two emerging markets: China and Brazil. Int. Mark. Rev. 2015, 32, 389–413.

Toronto Star Psychology of Colour. 2005, 1–4.

Truong, K.P.; Neerincx, M.A.; Van Leeuwen, D.A. Measuring emotions using eye tracking Jakob. In Proceedings of the International Conference on Methods and Techniques in Behavioural Research, Maastrich, The Netherlands, 26–29 August 2008; p. 226.

Tseng, K.C. Behavioural finance, bounded rationality, neuro-finance, and traditional finance. Invest. Manag. Financ. Innov. 2006, 3, 7–18.

Tsurumi, T.; Managi, S. Monetary Valuations of Life Conditions in a Consistent Framework: The Life Satisfaction Approach. J. Happiness Stud. 2017, 18, 1275–1303.

U

United Nations. Sustainable Development Goals. 2016. Retrieved from: http://www.un.org/sustainabledevelopment/sustainable-development-goals. (accessed on 12/06/2020).

V

Vainio, S.H. A cross-cultural comparison of colour-emotion associations of Finland, Norway, China and Greece. 2016.

Valdez, P.; Mehrabian, A. Effects of Colour on Emotions. J. Exp. Psychol. Gen. 1994, 123, 394–409.

Van Loo, E.; Caputo, V.; Nayga Rodolfo M., J.; Meullenet, J.-F.; Crandall, P.G.; Ricke, S.C. Effect of Organic Poultry Purchase Frequency on Consumer Attitudes Toward Organic Poultry Meat. J. Food Sci. 2010, 75, S384–S397.

Vandenbroele, J.; Vermeir, I.; Geuens, M.; Slabbinck, H.; Van Kerckhove, A. Nudging to get our food choices on a sustainable track. Proc. Nutr. Soc. 2020, 79, 133–146.

Vantomme, D.; Maggie, G.; Houwer, J. De; Pelsmacker, P. De Implicit Attitudes Toward Green Consumer Behaviour. Psychol. Belg. 2005, 45, 217–239.

Vega-Zamora, M.; Parras-Rosa, M.; Torres-Ruiz, F.J. You Are What You Eat: The Relationship between Values and Organic Food Consumption. Sustainability 2020, 12, 3900.

Vega-Zamora, M.; Torres-Ruiz, F.J.; Murgado-Armenteros, E.M.; Parras-Rosa, M. Organic as a Heuristic Cue: What Spanish Consumers Mean by Organic Foods. Psychol. Mark. 2014, 31, 349–359.

Verhoef, P.C. Explaining purchases of organic meat by Dutch consumers. Eur. Rev. Agric. Econ. 2005, 32, 245–267.

Vermeir, I.; Van Kenhove, P. The influence of need for closure and perceived time pressure on search effort for price and promotional information in a grocery shopping context. Psychol. Mark. 2005, 22, 71–95.

Vermeir, I.; Verbeke, W. Sustainable food consumption: Exploring the consumer "attitude - Behavioural intention" gap. J. Agric. Environ. Ethics 2006, 19, 169–194.

Veromann, P.M.A.W.E.; Strassner, C.; Średnicka-Tober, D.; Kahl, J.; Bügel, S.; Briz, T.; Kazimierczak, R.; Brives, H.; Ploeger, A.; Lüder, V.; et al. Students' knowledge and expectations about sustainable food systems in higher education. Int. J. Sustain. High. Educ. 2020.

Vidal, L.; Ares, G.; Jaeger, S.R. Use of emoticon and emoji in tweets for food-related emotional expression. FOOD Qual. Prefer. 2016, 49, 119–128.

Vogtmann, H.; Matthies, K.; Kehres, B.; Meier-Ploeger, A. Enhanced Food Quality: Effects of Composts on the Quality of Plant Foods. Compost Sci. Util. 1993, 1, 82–100.

W

Weber, J.L. Analyzing the Correlation Between Overall Likeness and Emotional Responses Before and After the Consumption of Dairy Beverages A Senior Project of the Dairy Science Department California Polytechnic State University, San Luis Obispo In Partial Fulfillmen. 2012, 1–24.

Wang, J.; Bao, J.; Wang, C.; Wu, L. The impact of different emotional appeals on the purchase intention for green products: The moderating effects of green involvement and Confucian cultures. Sustain. Cities Soc. 2017, 34, 32–42.

Whitmarsh, L.; O'Neill, S. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. J. Environ. Psychol. 2010, 30, 305–314.

William, Y.; Kumju, H.; Seonaidh, M.; Caroline, J.O. Sustainable consumption: green consumer behaviour when purchasing products. Sustain. Dev. 2010, 18, 20–31.

Wilms, L.; Oberfeld, D. Colour and emotion: effects of hue, saturation, and brightness. Psychol. Res. 2017, 1–19.

Wilson, T.D.; Lindsey, S.; Schooler, T.Y. A Model of Dual Attitudes. Psychol. Rev. 2000, 107, 101–126.

Winkielman, P.; Berridge, K.C. Unconscious Emotion. Am. Psychol. Soc. 2004, 13, 120–123.

X

Xing, C.; Isaacowitz, D.M. Aiming at Happiness: How Motivation Affects Attention to and Memory for Emotional Images. Motiv. Emot. 2006, 30, 243–250.

Z

Zagata, L. Consumers' beliefs and behavioural intentions towards organic food. Evidence from the Czech Republic. Appetite 2012, 59, 81–89.

Zhou, G.; Sun, C.; Knoll, N.; Hamilton, K.; Schwarzer, R. Self-efficacy, planning and action control in an oral self-care intervention. Health Educ. Res. 2015, 30, 671–681.
Zhang, W., Gowdy, J., Bassi, A.M., Santamaria, M., DeClerck, F., Adegboyega, A., Andersson, G.K.S.; Augustyn, A.M., Bawden, R., Bell, A., Darknhofer, I., Dearing, J., Dyke, J., Failler, P., Galetto, L., Hernández, C.C., Johnson; P., Jones, S.K., Kleppel, G., Komarek, A.M., Latawiec, A., Mateus, R., McVittie, A., Ortega, E., Phelps, D., Ringler, C., Sangha; K.K., Schaafsma, M., Scherr, S., Hossain, M.S., Thorn, J.P.R., Tyack, N., Vaessen, T., Viglizzo, E., Walker, D., Willemen, L. and; Wood, S.L.R. Systems thinking: an approach for understanding 'eco-agri-food systems'; 2018; ISBN 9789280737028

Appendix

Cognitive survey and Likert scale

Likert Scale: Sensory evaluation	5-point scale
How much did you like the apple taste?	1: strongly dislike - 5: strongly like
Please rate the intensity of the emotion which best describes what you felt when you tasted the ''sample'': Proud, happy, determined, angry, regret, guilty, encouraged, active, sad, optimistic, scared, ashamed	1: I do not feel at all – 5: I strongly feel it

Cognitive survey	5-point scale
Nr.	This is the same code that will be used in the sensory evaluation
I describe my knowledge about organic food concept as	1: very poor – 5: very good
How much organic food do you usually buy every month?	All the food I buy is organic. (I do not buy any conventional food) Most of them About a half A little I don't buy any organic food
How much organic food do you wish to buy in reality (in case you are not buying the amount you want)?	I wish that all the food I buy is organic Most of it Only half of it Only a little I don't wish to buy any organic food

I started consuming organic	Recently A few years ago Since childhood
I buy organic food because I am encouraged by the	
Health aspect	1: not important at all – 5: very important
Taste	1: not important at all – 5: very important
Appearance	1: not important at all – 5: very important
The environmental aspect	1: not important at all – 5: very important
Animal welfare	1: not important at all – 5: very important
Rewarding myself	1: not important at all – 5: very important
When I consume organic food, I feel: Proud, happy, determined, angry, regret, guilty, encouraged, active, sad, optimistic, scared, ashamed	1: I do not feel at all – 5: I strongly feel it
When I consume conventional food, I feel: Proud, happy, determined, angry, regret, guilty, encouraged, active, sad, optimistic, scared, ashamed	1: I do not feel at all – 5: I strongly feel it
In general, When I think about organic food, I describe it as	
High price product	1: definitely not - 5: definitely
Environmentally-friendly products	1: definitely not - 5: definitely
Healthy products	1: definitely not - 5: definitely
Good wellbeing means that a person has a healthy body and positive emotions and moods in general. I am satisfied with my wellbeing statue	1: completely disagree at all - 5: completely agree
I believe that consuming organic food is the main factor behind having good wellbeing	1: completely disagree at all - 5: completely agree
When I go to the market having the intention to buy organic food, but then due to whatever reasons I end up not buying it all as organic as I wish for, I think that this purchasing behaviour might have a negative impact on my wellbeing	1: completely disagree at all - 5: completely agree
Age	
Gender	
Education	
Occupation	
Nationality	