Meat on the menu?

Digital nudging towards sustainable consumption

Master thesis
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Academic year: 2020/2021

“Vegetarian food leaves a deep impression on our nature. If the whole world adopts vegetarianism, it can change the destiny of humankind.”

- A. Einstein

Abstract

Aim - Climate change is one of the greatest global problems and is mainly caused by greenhouse gas emissions (GHG). One of the biggest contributors to GHG emissions is the livestock sector, more specifically the meat industry. In order to decrease meat consumption and lead consumers to more sustainable consumption, this research examines the effects of the default option nudge and the descriptive norm nudge on food choice and attitude towards meat consumption in a digital shopping environment. Additionally, the interaction effect between these nudges is tested as well as the moderating effect of meal type.

Method - A digital shopping environment was created, which was subjected to an eye-tracking usability test prior to the main research. Furthermore, two pre-tests using the Q-methodology technique were conducted in order to find suitable dinner and lunch recipes. For the main research, an experiment in the digital shopping environment was conducted, followed by a questionnaire. A total of 404 responses were collected and after data cleaning, 232 valid responses were subjected to statistical analyses.

Results - Results show significant effects for the default option nudge on food choice; when a vegetarian default option was presented, more vegetarian purchases were made compared to when a meat default option was presented. This effect was even greater when a vegetarian descriptive norm was present as well, indicating an interaction effect between the default option nudge and the descriptive norm nudge. The descriptive norm nudge on its own had no significant effects. Finally, results show that meal type significantly moderated the effects of the default option nudge on food choice; when a vegetarian lunch recipe was presented, more vegetarian purchases were made compared to when a vegetarian dinner recipe was presented. All results for attitude towards meat consumption were insignificant.

Conclusions – These findings indicate that the default option nudge can effectively nudge consumers towards more sustainable consumption. Furthermore, this effect can be enhanced by combining the default option nudge with a descriptive norm. Additionally, it can be concluded that the default option nudge has a stronger effect on lunch recipes compared to dinner recipes. Policy makers and recipe providers may benefit from these findings when further aiding the promotion of sustainable consumption.

Keywords - digital nudging, descriptive norm, default option, food choice, sustainable consumption, attitude towards meat consumption.

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1. Introduction

Climate change has been a growing global problem, especially since the acceleration of greenhouse gas (GHG) emissions after World War II (IPCC, 2018). The problem has been brought under the attention of the general public ever since the IPCC's first report in 1990. In the Paris Agreement of 2015 member countries agreed to make every effort to keep global temperature rise limited to 1.5 degrees Celsius. However, most countries are still not on track to deliver their nationally determined contributions (NDC's) and global GHG emissions are still growing (United Nations Environment Programme, 2019).

One of the biggest contributors to GHG emissions is the livestock sector (FAO, 2006, 2013), as it is accountable for approximately 14.5% of all human-induced GHG emissions (FAO, 2013). More specifically, within the livestock sector, the meat industry is one of the leading polluters (Djekic, 2015). According to a research by Heller and Keoleian (2015) using data from USDA Economic Research Service (ERS) Loss-Adjusted Food Availability (LAFA) data series, beef production and consumption alone account for 36% of all retail-food generated greenhouse gasses while only accounting for 4% of the food supply (Heller & Keoleian, 2015; US Department of Agriculture, 2010). Additionally, meat products in general have more GHG emission per calorie than any other food (Tom et al., 2016). Therefore, decreasing meat consumption has great potential to reduce food-related GHG emissions. Since global meat consumption in almost every country in the world is increasing (Dagevos & Voordouw, 2013), social scientists face a major challenge in in discouraging this transition (Oskamp, 2000).

A specific way meat consumption could be decreased is through nudging. Nudges are activities that are designed to influence people's behaviour by gently 'pushing' them in a desirable direction without forbidding any choices (Thaler & Sunstein, 2008). Using nudges, meat consumers could potentially be nudged away from meat consumption, towards consumption of more sustainable foods like vegetarian substitutes. This would eventually decrease GHG emissions. To test if nudging can decrease meat consumption, an experiment will be conducted. Since digital nudges could potentially outperform nudges in a physical context (Weinmann et al., 2016), this experiment will take place in a digital environment.

A literature review by Wilson et al. (2016) concluded that a nudging intervention consisting of two types of nudges could have a more sustained effect than a single nudge. Therefore, two types of nudges will be used, namely the 'default option' nudge and the 'descriptive norm' nudge. Both nudges have proven effective in the field of sustainable

nudging, more specifically, on sustainable food choices (Campbell-Arvai et al., 2014; Demarque et al., 2015). The default option nudge is used to persuade consumers to pick the default option that was pre-selected for them. The descriptive norm nudge uses the principle of social proof (Cialdini, 2007) to persuade consumers by placing a norm of the behaviour of others under the same circumstances. Both nudges have been positively tested in the field of sustainable nudging on their own before. For example, a research by Goldstein et al. (2008) on descriptive norms shows that participants presented with a descriptive norm yielded a significantly higher towel re-use rate (44.1%) compared to participants presented with a standard environmental protection message (35.1%). In addition, Demarque et al. (2015) demonstrated the effects of descriptive norms on sustainable food choices. When a descriptive norm was present, 87.1% (weak norm), 83.3% (strong norm) and 96.9% (strong norm 2) of the participants bought at least one eco-product, compared to only 58.6% when the descriptive norm was absent. The effects of the default option on the purchase of renewable energy were tested by Pichert and Katsikopoulos (2008). Participants were confronted with a choice between different electricity suppliers. When the default option was set on renewable energy, 68% of the participants chose for renewable energy compared to only 41% when the default option was set on fossil energy. Subsequently, a research by Dinner et al. (2011) demonstrated the effects of the default option on the purchases of sustainable lightbulbs. When a sustainable lightbulb was pre-selected, 43.8% of the participants bought a sustainable lightbulb, but when an inefficient lightbulb was pre-selected, only 20.2% bought a sustainable lightbulb. Finally, the default option nudge has been tested in combination with informational cues on sustainable food choices (Campbell-Arvai et al., 2014). The results show that individuals who were assigned to a default option were more likely to choose a meat-free menu item than those who were not assigned to a default option.

Nudging towards sustainable food choices belongs to the field of ‘green nudging’. According to Lindström (2015), green nudging is a very understudied research field. More specifically, the field of sustainable consumption in particular is an understudied research field (Reisch & Thøgersen, 2015). At the time of writing, these claims might not entirely apply anymore, however, these research fields are still not fully understood in the context of nudging and are still emerging fields. Therefore, any research regarding green nudging and sustainable consumption will contribute to the literature on this topic.

Additionally, several situational factors have proven to influence sustainable consumption (Horgan et al., 2019). However, a situational factor that was not yet tested in the context of sustainable consumption, and could be a promising factor to take into account

when studying nudges, is meal type. According to Winkler et al. (1999), dinner is seen as the most stable eating event while lunch is seen as the most flexible eating event. This research hypothesizes that lunch is 'easier' to nudge as it is generally a more flexible eating event. To examine this, meal type will be taken into account in this research.

Campbell-Arvai et al. (2014) identify multiple future research directions, one of which is to recreate a version of their experiment using the default option combined with norm based messages instead of informational cues. The gap of testing different nudging combinations is proposed in several other studies (Bonini et al., 2018; Cheung, et al., 2019) as this is still an emerging field. By testing different nudging combinations, this research could contribute to the literature on whether presenting multiple nudges together would cause interference between the nudges, or whether they would complement each other and have additive effects. Additionally, this could shed light upon underlying processes about which nudging technique works better in nudging consumers towards more sustainable food choices, if any at all. Hohle (2014) tested the effects of two single nudges, and a combination of these nudges on meat consumption. Results showed that the combination of these nudges had a more powerful effect than any of the single nudges, which shows an interaction effect was present between the nudges. To further aid the promotion of pro-environmental behaviour, this research will address the gap of using multiple nudges. As suggested by Campbell-Arvai et al. (2014), the combination of the default option nudge and the descriptive norm nudge will be tested. This research aims to contribute to the gaps discussed in the literature while also making theoretical contributions as to if the descriptive norm nudge can complement the default option nudge. The results should be used in the design of interventions and development of policies in order to reduce meat consumption. Since the results of this research could provide information on how to improve the promotion of sustainable foods, the practical implications of this research would be ideal for producers within the vegetarian market. These could benefit from the results of this study by improving the promotion of their products accordingly. Subsequently, such implications would help decrease meat consumption which could ultimately result in less GHG emission by the livestock sector. The following research questions are formulated:

RQ 1. To what extent do the default option nudge and the descriptive norm nudge influence sustainable food choices and attitude towards meat consumption?

RQ 2. To what extent does the descriptive norm nudge moderate the effects of the default option nudge on sustainable food choices and attitude towards meat consumption?

RQ 3. To what extent does meal type moderate the effects of the default option nudge and the descriptive norm nudge on sustainable food choices and attitude towards meat consumption?

An answer on these research questions will be formulated by analysing the results of an experiment in a digital supermarket environment. In this experiment, consumer behaviour is directly observed and controlled in conditions under which the decision are taken. The experiment was conducted in the context of a Dutch online supermarket.

2. Theoretical framework

2.1 Nudging

Nudging is a relatively new concept. Nudges are methods to unconsciously trigger behavioural change and influence choice. Thaler and Sunstein (2008) define nudging as “any aspect of the choice architecture that alters people’s behaviour in a predictable way without forbidding any options or significantly changing their economic incentives”. By changing the way choices are presented in the environment, people’s behaviour is affected. A ’choice architect’ in this definition is a person who sets the context and background for the decision-maker, most often researchers or policy makers (Ölander & Thøgersen, 2014). Thaler and Sunstein (2003) emphasize the term ‘libertarian paternalism’ while elaborating on the term nudge. Libertarianism is a political concept which entails the idea that individuals should not be limited in their freedom. The paternalistic concept entails the idea that a policy - or in this case, a nudge - should influence an individual’s choice only in the benefit of the individual choosing. Therefore, the libertarian paternalistic aspect of nudging entails the idea that nudges should only be designed to push individuals towards better choices without limiting their freedom. Furthermore, Hollands et al. (2013, p. 3) defined choice architecture as: ‘’interventions that involve altering the properties or placement of objects or stimuli within micro-environments with the intention of changing behaviour’’. To clarify, Hollands et al. (2013, p. 3) continue, ‘’Such interventions are implemented within the same micro-environment as that in which the target behaviour is performed, typically require minimal conscious engagement, can in principle influence the behaviour of many people simultaneously, and are not targeted or tailored to specific individuals’’. This definition emphasises the importance of the nudging intervention being implemented in the same micro-environment as that in which the target behaviour is performed. Furthermore, Hollands et al. (2013) emphasize that choice architecture should not target specific individuals but instead should target groups of people.

In the past decade, technological developments have grown exponentially. The internet has become a place most people visit every day. Therefore, many choices nowadays are being made in digital environments. The rise of the internet together with technological developments makes it possible for nudging to take place in these digital environments. Weinmann et al. (2016, p. 1) define digital nudging as ‘’the use of user-interface design elements to guide people’s behaviour in digital choice environments’’. Digital nudging is especially useful because of the ability of digital environments to be created and changed in

any way. This gives digital nudging the potential to outperform nudges in the offline environment; the implementation of digital nudges is easier, faster and cheaper compared to nudges in physical contexts (Weinmann et al., 2016). Although digital nudges might outperform offline nudges, not nearly as much research on digital nudges has been performed compared to nudges in the offline environment. Therefore, this research focuses on the effects of digital nudges.

One of the most common digital nudges is the default option nudge (Thaler & Sunstein, 2003). The default option nudge is used to persuade consumers to pick the default option that was pre-selected for them. Choice architecture is very easy altered in digital environments. Therefore, the default option nudge would be perfect for this study. A second nudge which would be perfect for use in digital environments is the descriptive norm nudge, which uses the principle of social proof (Cialdini, 2007) to persuade consumers. By placing a norm of the behaviour of significant others under the same circumstances in the choice setting, consumers are persuaded. Placing such a norm could very easily be achieved in digital environments. Therefore the second nudge tested in this study is the descriptive norm nudge.

2.2 Food choice and sustainable consumption

It has already been elaborated that meat consumption has negative effects on climate change due to the amounts of GHG emissions the meat industry generates. Regardless of the negative effects of meat consumption, in almost every country in the world, meat consumption becomes more attractive as the rising standard of living makes it affordable (Dagevos & Voordouw, 2013). This worldwide trend of increasing meat consumption is part of a broader process known as the nutrition transition (Popkin, 2001). The nutrition transition refers to a rise in the consumption of meat products as society evolves. Efforts to motivate sustainable consumption by reducing the consumption of meat goes against this trend of rising meat consumption and is therefore, a big challenge. This study contributes to reaching to this goal by studying the effects of nudges on sustainable consumption.

There is no commonly agreed upon definition of sustainable consumption in the literature, however, the SDC (Sustainable Development Commission) states that sustainable consumption ‘respects biophysical and environmental limits in its production and processing while reducing energy consumption and improving the wider environment.’ (Sustainable Development Commission, 2005). In addition, sustainable food should avoid damaging or wasting natural resources or contributing to climate change (Pothukuchi & Kaufman, 1999, as cited in Piazzi, 2017). As this research contributes to the purpose of reducing meat

consumption to limit climate change, this definition is used throughout this research.

Sustainable consumption can be abstract. Some studies on nudging towards food choices measure food consumption, other studies only measure food selection. One may expect larger effects for food selection than for food consumption if the consumer does not actually have to eat the selected food. However, a meta-analysis (Cadario & Chandon, 2020) shows that there are no differences in the effect sizes of nudges on food selection or actual consumption.

In this study, food choice is a dependent variable, measured as a dichotomous variable (0 = vegetarian, 1 = meat). Food choice is the behaviour that results from the manipulation of the default option and the descriptive norm that will be provided in the experiment. According to the literature on sustainable consumption, food choice can be manipulated using different types of nudges. Campbell-Arvai et al. (2014) showed that consumers can be successfully nudged towards choosing meat-free menu's using the default option nudge. Demarque et al. (2015) successfully demonstrated that consumers can successfully be nudged towards the purchase of eco-products using the descriptive norm nudge. Finally, Hohle (2014) showed that consumers can be successfully nudged towards selecting vegetarian products over meat products using a combination of nudges. Based on the results of these studies, it is expected that nudging can effectively influence food choice.

2.3 Attitude towards meat consumption

An attitude is a "relatively enduring predisposition to respond favourably or unfavourably" toward something (Simons, 1976, p. 80), and presumed to influence behaviour. Individuals are not born with attitudes, they are learned evaluations. Therefore, attitudes can be changed. The Theory of Reasoned Action (Fishbein & Azjen, 1975) and the Theory of Planned Behaviour (Azjen, 1985) state that beliefs about costs and benefits of something, are likely to determine an individual's attitude towards that something. For example, the descriptive norm, one of this research's independent variables, uses social pressure of other people to influence the consumer's attitude in order to perform or to not perform the behaviour. This social pressure can be classified as the costs or benefits to perform or to not perform the desired behaviour. Additionally, the Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986), argues that attitudes can be changed using two methods of influence; the central route and the peripheral route. The central route to change the attitude of an individual towards something uses rational arguments and information to support a certain point of view. The peripheral route to change the attitude of an individual towards something relies on the

emotional involvement of the receiver of the message. This route uses less obvious cues in persuading someone and the receiver is mostly unaware of the persuasion occurring. Since nudging uses these same principles and operates along the same route as the peripheral route, nudges could be classified as persuasion using the peripheral route (Booth-Butterfield, 2016). Therefore, it is expected that nudging can influence attitude as well. Based on this expectation, the effects of nudging on attitude towards meat consumption is tested.

Attitude towards food in general is formed according to an individual's particular background, cultural and social settings to which an individual is exposed in their lives, and the timing of their experiences (Bourdieu, 1984; Fischler, 1988; Devine & Olson, 1991, as cited in Furst et al., 1996). Additionally, males displayed significantly more positive attitudes towards meat consumption (Kubberød et al., 2002) and were less likely to adopt vegetarian lifestyles compared to females (Kalof et al., 1999; Janda & Trocchia, 2001). Finally, Guenther et al. (2005) found effects of education level on the likelihood of consuming meat. For these reasons, socio-demographics will also be tested in this research.

2.4 Default option nudging

One of the most recent applications of the default option nudge is the organ donor register in the Netherlands. A new law that took effect on the first of July 2020 determined that every citizen of 18 years or older agrees to being an organ donor unless this default setting is actively opposed (Donorregister, 2018).

The default option nudge is used to persuade customers to pick the default option that was pre-selected for them. This nudging type is one of the most frequently used nudges. The default option nudge focuses on the architecture of choice, highlighting one particular choice by default and organizing the alternative choices around the pre-selected default. Consumers that are nudged to more sustainable choices through the use of default options do not feel misled or disrespected, but actually feel assisted in leading a responsible life (Korthals, 2015). Bonini et al. (2018), describe four ways this nudge works. First, some people do not even notice that they had to make a choice and therefore unconsciously choose the default option. Second, people assume that the default option is recommended by experts and therefore 'go along with the flow' (Keller et al., 2011). Third, economic choice theory suggests that consumers save time by making decisions that minimize time costs (Becker, 1965). Investing time in making a decision is avoided by agreeing to the default option (Keller et al., 2011; Johnson & Goldstein, 2003). Lastly, research has proven that customers prefer not choosing and accepting the default option rather than choosing themselves and regretting their own

decision later on (Ritov & Baron, 1992). This is based on the loss-aversion bias demonstrated by Tversky and Kahneman (1992) which holds the idea that losing something feels worse than gaining something of the same amount.

The effectiveness of choice architecture has been proven in several studies before. For example, choice architecture improved healthy food choices in a hospital cafeteria in Boston (Levy et al., 2012) and this effect was even greater when choice architecture was combined with a second nudge (Thorndike et al., 2012). Additionally, choice architecture increased fruit consumption in junior-senior high schools in New York by 18% and vegetable consumption by 25% (Hanks et al., 2013). Finally, choice architecture significantly increased the frequency of fruit and vegetables consumed from 2.97 to 4.09 on three elementary schools in Los Angeles participating in the USDA reimbursable lunch programme (Slusser et al., 2007).

Furthermore, the default option nudge by itself has been used in the field of nudging towards sustainable choices as well. For example, a study by Dinner et al. (2011) successfully used the default option to nudge consumers towards using more sustainable lightbulbs; in two experiments, respectively 20.2% and 23.6% of the participants given an unsustainable lightbulb as default option chose to use the sustainable lightbulbs while 43.8% and 46.5% of the participants given a sustainable lightbulb as default option chose to use the sustainable lightbulbs. Another study successfully used the default option to nudge consumers towards the use of more sustainable energy (Pichert & Katsikopoulos, 2008). When fossil energy was the default option, 41% of the participants chose the sustainable energy option compared to 68% when sustainable energy was the default option. Finally, a meta-analysis on healthy eating nudges classified the default option nudge into the category “convenience enhancements” which is in turn classified as a behaviourally oriented nudging intervention. In this meta-analysis it was concluded that a behaviourally oriented nudging intervention is estimated to be 3.2 times as effective as a cognitively oriented nudging intervention (Cadario & Chandon, 2020). The following hypothesis is formulated:

Hypothesis 1. When consumers are confronted with a vegetarian recipe set by default, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are confronted with a meat recipe set by default.

2.5 Descriptive norm nudging

Cialdini (2007) identified six principles with which to influence customer behaviour, one of these principles being social proof. This principle holds the idea that, when uncertain

about how to behave, people have the tendency to look at the behaviour of others. Cialdini describes this phenomena as ‘’deciding what we should do in a situation by looking at what others like us do in that situation’’ (Cialdini, 2001, p. 296). Social norms use this principle as well. People do not want to feel excluded and therefore, social norms are used as an indication of how to behave. Past research has distinguished social norms into two types, injunctive norms and descriptive norms (Cialdini et al., 1990). Injunctive norms describe what most others approve or disapprove. They refer to what ought to be done. Descriptive norms are used to inform people about what the majority of others do in similar circumstances. Additionally, injunctive norms are most effective when changing attitudes while descriptive norms are most effective when changing behaviour (Melnyk et al., 2010). This study investigates both if attitude as well as behaviour can be influenced. However, since actual behaviour has a direct effect on the total amount of meat consumed worldwide, descriptive norms are preferred over injunctive norms as they seem more effective on behaviour.

The effectiveness of the descriptive norm nudge has been proven in several studies before. For example, Gerber and Rogers (2009) successfully used descriptive norms to manipulate voters motivation to vote. In their field experiment, participants in New Jersey and California were presented with either a high turnout script or a low turnout script. These scripts were designed to influence the participants perception of whether voter turnout would be high or low. Results showed that 76.3% of participants presented with a high turnout script produced a response of 100% likely to vote, compared to 68.9% of participants presented with a low turnout script. Additionally, descriptive norms significantly increased the amount of taxpayers filing their tax after a reminder in South East England (Larkin et al., 2019). Taxpayers who failed to meet their payment deadline received a reminder letter with either a descriptive norm, an enforcement salience message or the standard reminder letter. In the control group, 62.97% of households made a payment. When this letter included an enforcement salience message, 69.85% of households made a payment and when this letter included a descriptive norm, 75.69% of households made a payment. Finally, descriptive norms effectively decreased elevator use to go up one or two floors (Burger & Shelton, 2011). The descriptive norm “Did you know? More than 90 percent of the time, people in this building use the stairs instead of the elevator. Why not you?” decreased elevator use from 37.64% to 7.92% over a span of three weeks.

Furthermore, descriptive norms have been used in the field of nudging towards sustainable choices as well. For example, Demarque et al. (2015) successfully used descriptive norms to improve the purchases of eco-products in a realistic online shopping

environment. When a descriptive norm was present, 87.1% (weak norm), 83.3% (strong norm) and 96.9% (strong norm 2) of the participants bought at least one eco-product, compared to only 58.6% when the descriptive norm was absent. Additionally, a research on the energy usage of households in middle-class neighbourhoods of San Marcos, California found that participants in a descriptive norm condition used significantly less energy in the short term compared to participants in the combined other conditions (Nolan et al., 2008). Finally, Goldstein, et al. (2008) successfully used the descriptive norm ‘’Almost 75% of guests who are asked to participate in our new resource savings program do help by using their towels more than once’’ to improve towel re-use rates in hotels from 35.1% to 44.1%. The following hypothesis is formulated:

Hypothesis 2. When consumers are confronted with a vegetarian descriptive norm, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are not confronted with a vegetarian descriptive norm.

The formulation of a norm plays an important role in the effectivity of the norm. Demarque et al. (2015) examined the most effective ways descriptive norms could be formulated to positively influence the purchases of sustainable products, specifically in a target group that is likely to have a low true sustainable consumption rate. In their study, they discussed the four aspects that are of importance when formulating a descriptive norm. First, it is more likely that a descriptive norm will be followed if the follower feels like he/she belongs to the same group. Communication accommodation theory (CAT) categorizes such groups as in-groups; social affiliations to which an individual feels like he/she belongs. When a person wants to be viewed as part of an in-group, convergence can occur. This means that a person will accommodate their communication or behaviour so that it matches that of the group (Giles et al., 1991). Additionally, according to several studies (Cialdini, 2003; Melnyk et al., 2010; Stok et al., 2012; Terry & Hogg, 1996), people are more likely to engage in particular behaviour if it is in accord with the norms of a behaviourally relevant group membership. Therefore, the importance of the in-group used within a norm is notable. Second, using an untrue norm that deceitfully leads consumers to believe that most people indeed follow that norm, risks losing confidence in the source or even losing its credibility (Demarque et al., 2015). Such loss in confidence or credibility would cause great damage to a company using these norms. Therefore, a true norm should always be used. According to a research by Kien Onderzoek (2019), 37% of the Dutch typify themselves a flexitarian (do not

eat meat at least one day per week). However, according to another research by Kien Onderzoek (2016), 67% of the Dutch actually have the eating pattern of a flexitarian. Although the difference between these was not entirely clear from the research reports, it was later clarified through e-mail (R. Aarnoudse, personal communication, July 7th, 2020). According to the descriptive norm criteria mentioned above, the percentage used in a descriptive norm should be based on facts. Therefore, the percentage of 67% is fit for use in the framing of the descriptive norm used in this study. Third, by choosing verbal quantifiers with a positive polarity, descriptive norms may encourage consumers to take action more effectively than by choosing verbal quantifiers with a negative polarity (Schmeltzer & Hilton, 2014). Therefore, positive polarity quantifiers like 'some, many, more than, almost' will be used in this study over negative polarity quantifiers like 'not many, not at all, at most' as these draw more attention to performing the desired behaviour. Lastly, descriptive norms are most effective when multiple positive quantifiers are used to accentuate the actual rate of other people's behaviour, also when this number is relatively low. Goldstein et al. (2008) framed their descriptive norm as positive as possible by using the double positive quantification strategy. In their study they used the descriptive norm ''Almost 75% of guests who are asked to participate in our new resource savings program do help by using their towels more than once'' which contains multiple positive quantifiers and they successfully increased towel re-use rate. Formulations that draw attention to positive trends may also be effective (Demarque et al., 2015). Therefore, multiple positive quantifiers and positive trends will be taken into account while formulating the descriptive norm for this study.

Additionally, besides these four aspects, the literature regarding the formulation of norms describes the influence of negations (e.g., not stupid) and affirmations (e.g., smart) on the effectiveness of a norm. The negation bias (Beukeboom et al., 2010) presumes that when a desired behaviour is communicated with a negation (e.g., not stupid), the communicated impression is more negative than when it is described with an affirmation (e.g., smart). This assumption was tested in a study (Beukeboom et al., 2010) which indicated that when negations were used to describe behaviour, participants would be less likely to repeat this behaviour compared to when affirmations where used. Therefore, it is recommended to avoid negations (e.g., 'do not eat meat') and use affirmations (e.g., 'eat vegetarian') when formulating a norm.

2.6 Interaction effect: Descriptive norm x Default option

Most researches on nudging towards sustainable choices have focused on the use of

single nudges (Pichert and Katsikopoulos, 2008; Campbell-Arvai et al., 2014; Demarque et al., 2015). A literature review by Wilson et al. (2016) concluded that a nudging intervention consisting of two types of nudges could have a more sustained effect compared to a single nudge. Hohle (2014) tested the effects of two single nudges, and a combination of these nudges on meat consumption. Results showed that the combination of these nudges had a greater effect than any of the single nudges, which shows an interaction effect was present between the nudges. Moreover, a recent study by Ingendahl et al. (2020) investigated the effects of the default option nudge, the social norm nudge, and a combination of these nudges. Results showed that both nudges had an individual effect and that a combination of these nudges lead to an even stronger effect. Finally, Kallgren et al. (2000) examined the effects of descriptive norms in several environments set by default. Results showed that presence of descriptive norms increased littering behaviour in a littered environment, but decreased littering behaviour in a clean environment. Therefore, it is expected that the use of a vegetarian default option is more effective when a vegetarian descriptive norm is present as well, as this would lead to an interaction effect between the two nudges. This has led to the following hypothesises:

Hypothesis 3. When consumers are confronted with a vegetarian recipe set by default containing a vegetarian descriptive norm, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are confronted with a vegetarian recipe set by default not containing a vegetarian descriptive norm.

2.7 Interaction effect: meal type

Meat consumption of individuals depend on demographical factors like age, gender (Thomas, 1991), race and ethnicity (Gossard & York, 2003), but also on social factors like location of residence and social class (Gossard & York, 2003). Additionally, situational factors that have proven to influence meat consumption are; eating situation, like eating alone or eating with others; eating place, like eating out or eating at home; and even the day of the week (Horgan et al., 2019). A situational factor that has not yet been tested in the context of meat consumption is meal type. There are three main meal types, namely breakfast, lunch and dinner. Breakfast accounts for approximately 14% of daily energy intake, lunch for 21% and dinner for 37% (Fayet et al., 2012). Additionally, Laing (1999) showed that meat was most commonly eaten at dinner (M = 2.9) and lunch (M = 1.5), and considerably less often during breakfast (M = 0.27) and as a snack (M = 0.27). Moreover, dinner seems to be the most stable

and fixed eating event and lunch seems to be handled the most flexible by consumers (Winkler et al., 1999). Since lunch and dinner are the meals accounting for most food consumption (Fayet et al., 2012) and additionally for most meat consumption (Liang, 1999), lunch and dinner would have the greatest potential in reducing the amounts of meat eaten. Furthermore, since dinner is seen as the most stable eating event and lunch is seen as the most flexible eating event (Winkler et al., 1999), this research hypothesizes that consumers in a lunch condition are relatively 'easier' to nudge compared to consumers in a dinner condition. It is expected that nudging towards a vegetarian recipe will be more effective in a lunch recipe condition as opposed to a dinner recipe condition, and therefore, the effects of default option setting and descriptive norms on food choice and attitude towards meat consumption depend on the meal type. To examine this relationship, meal type is added as a moderator variable. The following hypothesises are proposed.

Hypothesis 4. When consumers are presented with a lunch recipe and are presented with a vegetarian recipe by default, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are presented with a dinner recipe.

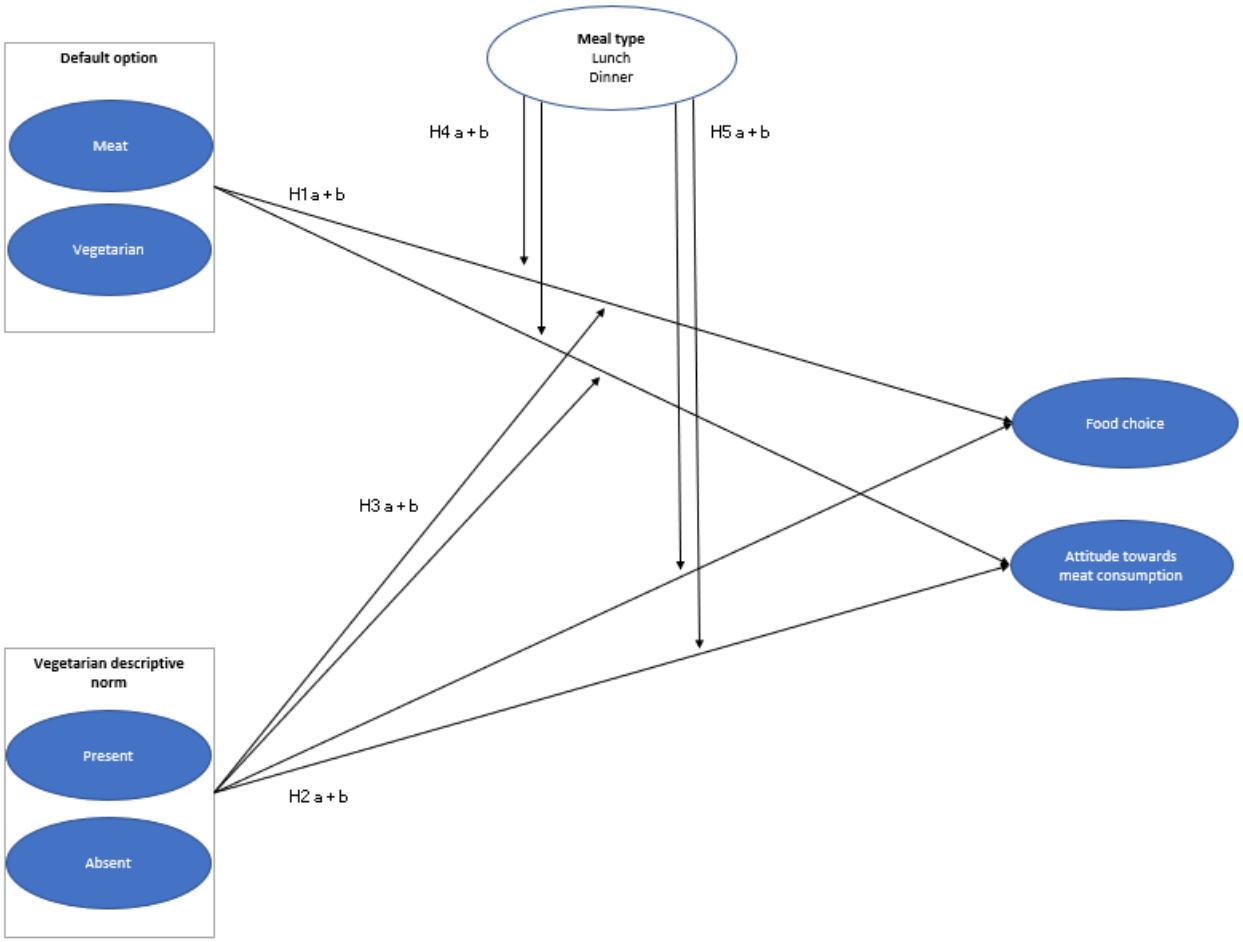
Hypothesis 5. When consumers are presented with a lunch recipe and are presented with a vegetarian descriptive norm, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are presented with a dinner recipe.

2.8 Research design

The research model and hypothesises are visualized in Figure 1 below.

Figure 1.

Research Model



3. Methods

3.1 Experimental design

The conditions of this research are presented in the 2 (default option, e.g., meat or vegetarian) by 2 (descriptive norm, e.g., present or absent) by 2 (meal type, e.g., dinner or lunch) between-subjects experimental design in Table 1. The independent variables are the 'default option' nudge and the 'descriptive norm' nudge. Additionally, the effects of a moderator 'meal type' will be tested. The variable 'descriptive norm' will also be tested as a moderator variable. The dependent variables are 'food choice' and 'attitude towards meat consumption'. The research was approved by the BMS Ethics Committee.

Table 1.

Scenarios in the 2x2x2 Design

Scenario	Meal type	Default option	Descriptive norm
Scenario 1	Meal type: Dinner	Default option: Meat	Descriptive norm: Present
Scenario 2	Meal type: Dinner	Default option: Vegetarian	Descriptive norm: Present
Scenario 3	Meal type: Dinner	Default option: Meat	Descriptive norm: Absent
Scenario 4	Meal type: Dinner	Default option: Vegetarian	Descriptive norm: Absent
Scenario 5	Meal type: Lunch	Default option: Meat	Descriptive norm: Present
Scenario 6	Meal type: Lunch	Default option: Vegetarian	Descriptive norm: Present
Scenario 7	Meal type: Lunch	Default option: Meat	Descriptive norm: Absent
Scenario 8	Meal type: Lunch	Default option: Vegetarian	Descriptive norm: Absent

3.2 Pre-tests

3.2.1 Q-methodology

In order to find a dinner and lunch recipe that are likely to be eaten either with meat as without meat, two pre-tests using the Q-methodology technique (Stephenson, 1953) are conducted. Using the Q-methodology technique, the most suitable recipes for lunch and dinner were assessed. The Q-sort pre-tests were translated to Dutch, as this was also the language of the participants participating in the Q-sort pre-tests. Q-studies study peoples subjectivity. In a Q-sort, a number of purposively selected participants are asked to rank a number of statements in a specific order according to their viewpoint. It is important to have more statements than participants. A 3:1 ratio is often used (Webler et al., 2009). The web application Qsortware.net is designed for academic research in particular (Pruneddu, 2020).

Therefore, this application was used to conduct the Q-sorts. A screenshot from the Q-sort environment can be found in appendix C. The data of the Q-sorts is analysed using Microsoft Excel. The mean scores of the statements were calculated and the statements that all the perspectives agreed upon were highlighted. The best ranked statements are chosen as the recipes used in this study.

3.2.2 Q-sort dinner

The Q-sample for the dinner Q-sort consisted of forty statements. The forty statements were based on twenty representative recipes. Every recipe is presented twice, with a vegetarian product as meat substitute (e.g. vegetarian chicken), AND with vegetable as meat substitute (e.g. paprika). Thus, each statement consisted of a combination of two recipes, a recipe with meat and a recipe without meat. The recipes are selected based on popularity and diversity, so that the Q-sample consists of a wide variety of common recipes. The most popular recipes from 'Knorr wereldgerechten', a Dutch food brand providing dishes from all over the world, are included in this Q-sample. The statements with recipes can be found in appendix A. The main question asked during the Q-sort was: 'How likely is it that you would want to eat both the recipe with meat as the recipe without meat?'. A quasi-normal distribution grid with 40 cells was developed and participants were asked to sort the 40 statements over this grid. This grid can be found in appendix B. According to the 3:1 ratio (Webler et al., 2009), at least 14 participants are required to obtain reliable results. A total of 15 participants participated in this pre-test. The average age was 25.27 (SD = 8.45); ages ranged from 19 to 55; 4 participants were female. Statement 9 (M = 1.87; SD = 2.00), statement 21 (M = 1.67; SD = 1.72) and statement 23 (M = 1.6; SD = 1.35) had the highest scores. Statement 23 (Mexican taco's with chicken & Mexican taco's with vegetables) had the lowest standard deviation which means this score is the most consistent and has the lowest variability. Therefore, the recipes in statement 23 were chosen for the main experiment, dinner condition. The full results of this pre-test can be found in appendix D.

3.2.3 Q-sort lunch

The Q-sample for the lunch Q-sort consisted of twenty statements. Similar to the dinner Q-sort, these statements were based on twenty representative recipes. But in contrast with the dinner Q-sort, every recipe is presented only once, with a vegetarian product as meat substitute (e.g. vegetarian chicken), OR with vegetable as meat substitute (e.g. paprika). This was done because the concourse of 'lunch recipes which can be eaten either with or without meat' is considerably smaller than the concourse of 'dinner recipes which can be eaten either

with or without meat'. The recipes are selected based on popularity and diversity, so that the Q-sample still consists of a wide variety of common recipes. The statements with recipes can be found in appendix A. The main question asked during the lunch Q-sort was the same as in the dinner Q-sort: 'How likely is it that you would want to eat both the recipe with meat as the recipe without meat?'. A quasi-normal distribution grid with 20 cells was developed and participants were asked to sort the 20 statements over this grid. This grid can be found in appendix B. According to the 3:1 ratio (Webler et al., 2009), at least seven participants are required to obtain reliable results. A total of 10 participants participated in this pre-test. The average age was 27.1 (*SD* = 10.27); ages ranged from 21 to 56; 3 participants were female. Statement 1 (Panini with mozzarella, pesto and chicken & Panini with mozzarella, pesto and tomato) had the highest score (*M* = 2.4; *SD* = 0.84). Therefore, the recipes in statement 1 were chosen for the main experiment, lunch condition. The full results of this pre-test can be found in appendix D.

3.3 Default option

The variable default option is indicated by pre-selecting either the vegetarian version of the recipe or the meat version of the recipe. Participants can change their dish and recipe to their preference whenever they want by clicking the 'switch' option. Depending on which default option is shown, the option to switch recipes is indicated with a button containing the text ''This recipe can also be prepared with/without meat. Click here for the recipe with tomatoes/chicken/vegetables.''. The differences between the meat and vegetarian default option conditions are kept as small as possible; the name of the recipe (e.g. 'Paninis with mozzarella, pesto and chicken' or 'Paninis with mozzarella, pesto and tomatoes'), the ingredients (e.g., 'chicken 400 gram' or '4 tomatoes') and the vegetarian label in the bottom right corner of the vegetarian recipe. The recipe images are kept exactly same and the preparation methods are framed as realistically possible in the same way (e.g., 'cut the chicken breast into slices' and 'cut the tomatoes into slices'). Additionally, the differences in preparation method between the dinner and lunch conditions are also kept as small as possible (e.g., 'spread the tacos with salsa and 'spread the paninis with pesto').

3.4 Descriptive norm

The variable descriptive norm is indicated by adding a descriptive norm to the recipes. As previously discussed in section 2.5, Demarque et al. (2015) examined the most effective ways descriptive norms could be formulated to positively influence the purchases of sustainable products. Four criteria were emphasized, specifically (1) the usage of a relevant

in-group within a norm, (2) the usage of a true statement within a norm, (3) the usage of verbal quantifiers with a positive polarity within a norm and (4) the usage of multiple positive quantifiers within a norm. Additionally, negation bias (Beukeboom et al., 2010) suggests that negations (e.g., ‘do not eat meat’) should be avoided when formulating a norm and affirmations (e.g., ‘eat vegetarian’) should instead be used. Based on these criteria and based on previously proven effective descriptive norms used in the field of sustainable nudging, the following descriptive norm was composed: ’Did you know that more than 66% of the Dutch eat vegetarian at least once a week? Try it as well!’. Using Microsoft Paint 3D (2016), a dialogue bubble capturing the norm was added to the conditions on the top right corner of the recipes. The dialogue bubble was given a bright red colour in order to make the norm salient. The salience of this norm was tested through an eye-tracking usability test.

3.5 Website

In order to measure food choice, a digital shopping environment was created. The domain name claimed for this digital shopping environment was https://www.jopraanhuis.nl/ which was provided with webhosting by Neostrada (2020). Webhosting is necessary in order to own the rights to a website. Without webhosting, a website could be deleted by the owner at any time, which would make the study less reliable. WordPress (2020) is used as the tool for the creation of website, combined with the WordPress plugins Elementor (2020) and WooCommerce (2020). To ensure reliability and validity in the experiment and to make the shopping environment as realistic as possible, the digital shopping environment is based on those of the two biggest online supermarket environments in the Netherlands; Jumbo and Albert Heijn. The main product page of Albert Heijn (2020) is used as a benchmark for the main page of the experimental website. Jumbo Supermarket was contacted and permission was granted for the use of product category pages, product descriptions and images if Jumbo was mentioned as a source on the website. (M. Rothuizen, personal communication, August 13th, 2020). As such, the product category pages, single product pages, descriptions and images of Jumbo Supermarkets are used (Jumbo, 2020). Besides the products needed for the experiment, decoy products are added to shape the shopping environment as realistic as possible. A total of 33 different products across 18 different categories were added. Finally, a shopping cart widget was installed. Please refer to appendix F for a complete overview of the website used for the online shopping environment.

3.6 Website usability testing

To test the usability of the digital shopping environment and to validate the salience of

the descriptive norm nudge placed on the website, a usability test using concurrent think-aloud protocols (CTA) combined with eye-tracking technology was conducted. Concurrent think-aloud protocols are seen to be the most practical compared to other think-aloud protocols like retrospective think-aloud (RTA) and constructive interaction (CI) (Elling et. al., 2012; Van den Haak, 2004). According to Hehman et al. (2015), motion trajectories like mouse-tracking and eye-tracking can be used to reflect underlying cognitive processes. The Tobii Pro Glasses 2 wearable eye-tracker was used throughout this usability test. A research on usability testing indicates that only five tests are needed to find 80% of the problems users experience on a website (Nielsen & Landauer, 1993; Nielsen, 2000). A total of 6 participants participated in this usability test. The average age was 23.83 (*SD* = 0.9); ages ranged from 22 to 25; 1 participant was female. Demographics of these participants can be found in Table 2. Participants were first presented with an information sheet and an informed consent paper. Subsequently, the Tobii Pro Glasses 2 were prepared and calibrated for the participant. Participants were then asked to think-aloud while conducting six different tasks on the website https://www.jopraanhuis.nl/. The researcher conducted several test sessions in advance of the actual data collection to get acquainted with the data collection program. The information sheet, informed consent and tasks used for this usability test were all translated to Dutch, as this was also the language of the participants in the usability test. For an overview of these, please refer to appendix G.

Table 2.

Demographics Participants Usability Test

Respondent	Gender	Age	Education	Date	Time	Duration	All tasks completed?
1.	Male	24	WO Master	October 27	12:13	18m 4s	Yes
2.	Male	22	HBO Bachelor	October 27	13:09	23m 17s	Yes
3.	Male	24	HBO Bachelor	October 27	14:00	17m 26s	Yes
4.	Female	24	WO Bachelor	October 27	14:40	13m 7s	Yes
5.	Male	25	HAVO	October 27	15:45	11m 20s	Yes
6.	Male	24	HBO Bachelor	October 27	16:38	18m 24s	Yes

The eye tracking data collected in the usability test was used to generate heat maps using the analyses software of Tobii Pro AB (2014). Heat maps show how gaze behaviour is distributed over the stimulus. The salience of the descriptive norm in the lunch and dinner conditions was tested by including scenario 1 and scenario 6 in the usability test. Figure 2 presents a heat map of the relative attention duration of all participants presented with scenario 1 (Meal type: Dinner; Default option: Meat; Descriptive norm: Present). Figure 3 presents a heat map of the relative attention duration of all participants presented with scenario 6 (Meal type: Lunch; Default option: Vegetarian; Descriptive norm: Present). Both heat maps indicate a high attention focus on the descriptive norm; the heat is particularly concentrated on the area where the descriptive norm is presented which suggests that the descriptive norm catches the attention of the participants, and thus, is made salient. Subsequently, these heat maps indicate a high attention focus on the button used to switch between recipes as well, which suggests that this button is made salient.

The quantitative data collected in the usability test was anonymously transcribed and coded. Based on the results, several adjustments were made to improve the user experience of the website. For example, several products were placed under two categories instead of one to make it easier to find these products.

Figure 2.

Heatmap of the Relative Attention Duration at Scenario 1

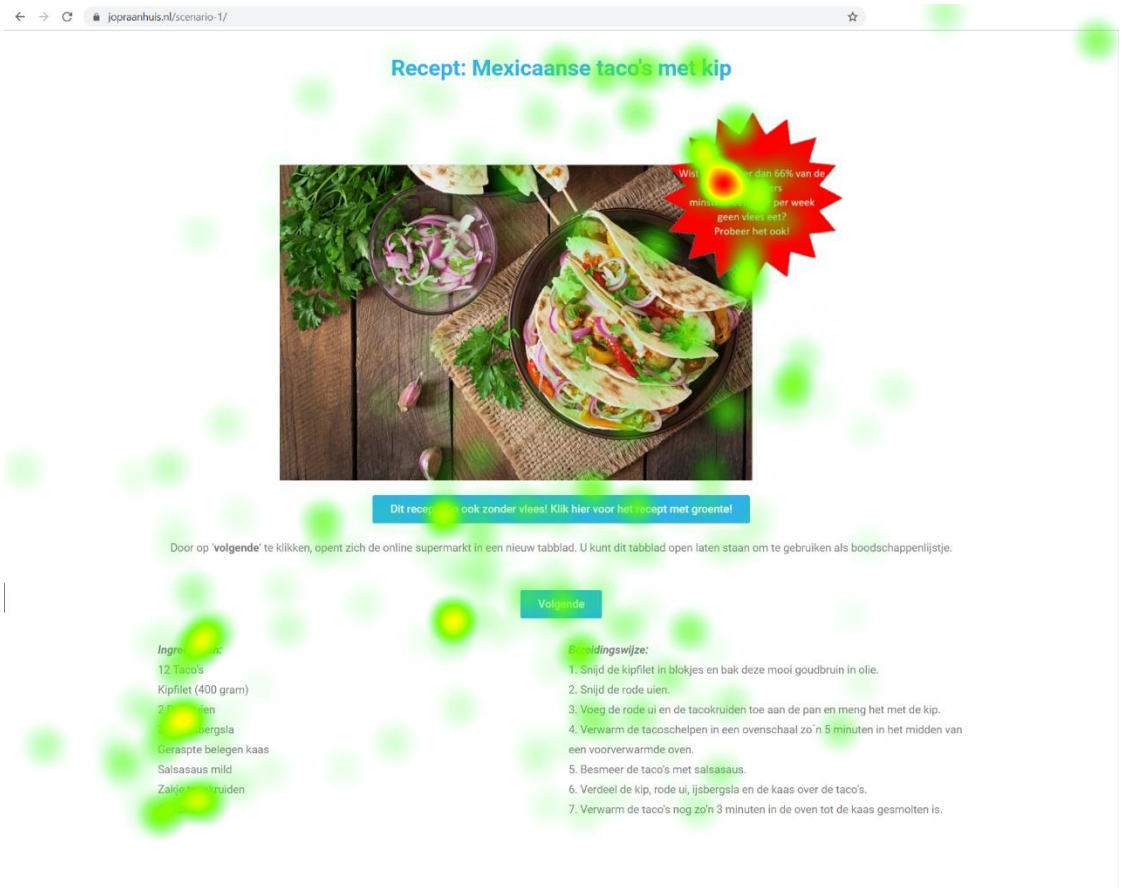


Figure 3.

Heatmap of the Relative Attention Duration at Scenario 6

3.7 Main study

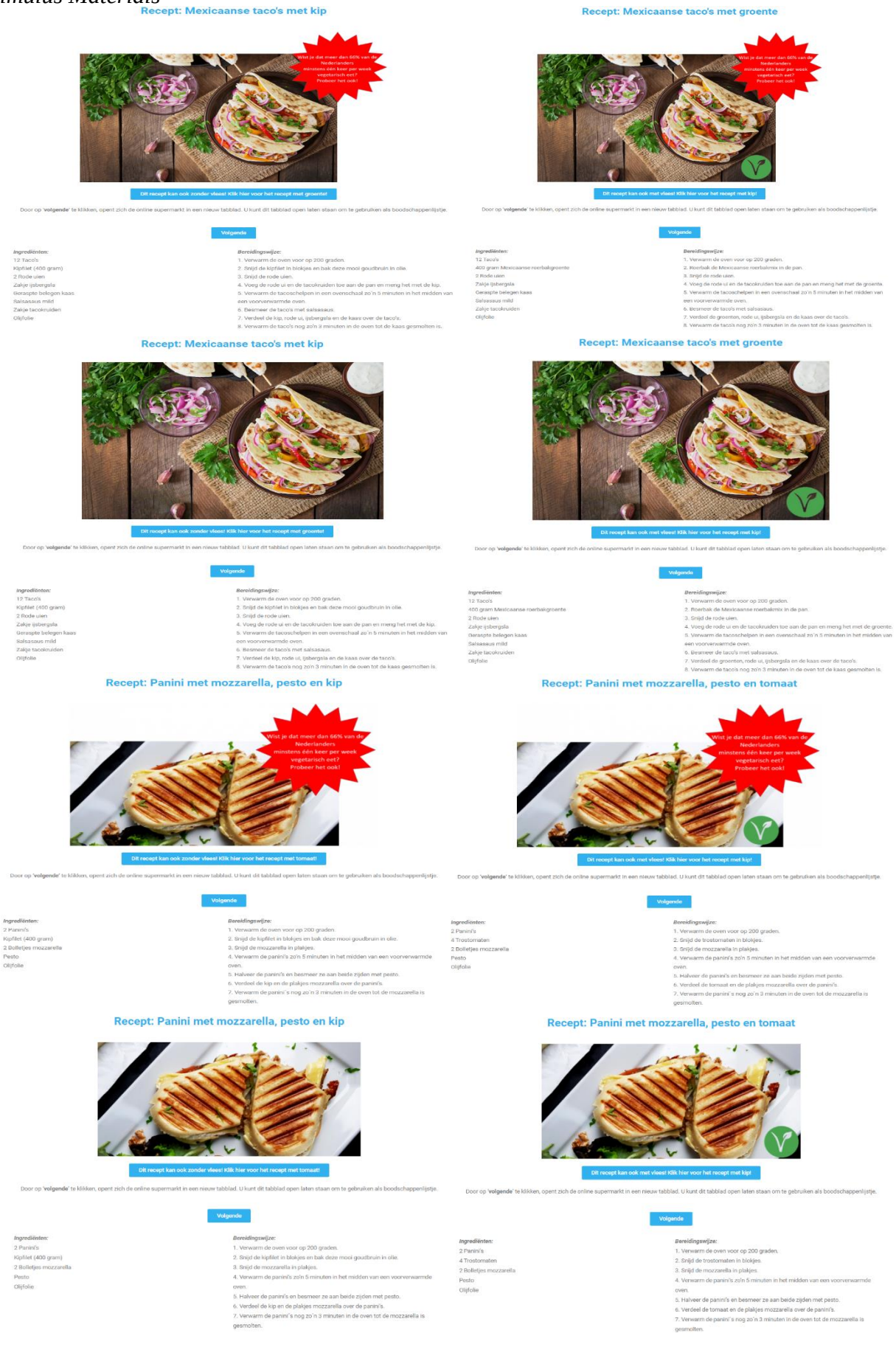
The main experiment was conducted in 7 parts using the Qualtrics Experience Management platform (Qualtrics, 2021) and a WordPress (2020) website. Prior to the experiment, participants were informed and consent was obtained. Secondly, participants demographics like age, gender and education level were collected. Participants that indicated they eat meat at dinner 0 or 7 days per week were excluded, because these types of participants would be too determined in their choice already. Thirdly, participants were randomly assigned to one of eight scenarios and instructed to read and observe the scenario attentively. In the fourth part, participants were instructed to choose one of two recipes and sent to an online supermarket environment to purchase the products needed for their recipe. In the fifth part, manipulation check questions were presented. In the sixth part, participants were requested to respond to several statements measuring the dependent variable attitude towards meat consumption and several other additional variables (attitude towards the recipe, likelihood to try the recipe, social desirability of eating meat and enjoyment of eating meat). In the seventh and final part, participants were debriefed about the nature of the experiment and thanked for their participation. A gift card for €20 was raffled as a reward for participation. Data cleansing was done and analyses were run using IBM SPSS Statistics 25 (IBM Corp, 2021).

3.8 Stimulus materials

The stimulus materials were embedded into the survey using HTML code. A total of eight scenarios were developed. The conditions differed between (1) a dinner recipe or (2) a lunch recipe, (1) a recipe with meat or (2) a recipe without meat, and (1) a recipe with a descriptive norm or (2) a recipe without a descriptive norm. Figure 4 below is used to give an impression of the stimulus materials employed. For a more detailed view, please refer to appendix E.

Figure 4.

Stimulus Materials



3.9 Manipulation check

3.9.1 Default option

To verify that the manipulation of the default option nudge was successful, a manipulation check was conducted. Respondents were asked to rate the item ‘’The recipe I was presented with was …’’ on a 5-point semantic differential scale (1 = A vegetarian recipe, 5 = A recipe with meat/chicken). An independent samples t-test revealed that there were significant differences between the vegetarian default option condition (M = 1.37, SD = 1.12) and the meat default option condition (M = 4.6, SD = 1.13), with t(230) = -21.97, $p < .001$. These results suggest that the manipulation of the default option nudge was successful.

3.9.2 Descriptive norm

Subsequently, to test if the manipulation of the descriptive norm nudge shows a significant difference, a second manipulation check was conducted. Respondents were asked to rate the item ‘’The recipe I was presented with contained …’’ on a 5-point semantic differential scale (1 = No red text balloon, 5 = A red text balloon with information about Dutch eating habits). An independent samples t-test revealed that there were significant differences between the norm absent condition (M = 1.80, SD = 1.05) and the norm present condition (M = 3.45, SD = 1.58), with t(211.818) = -9.461, $p < .001$. These results suggest that the manipulation of the descriptive norm nudge was successful.

3.9.3 Meal type

Finally, a third manipulation check was conducted to test if the manipulation of the meal type shows a significant difference. Respondents were asked to rate the item ‘’The recipe I was presented with was a recipe for …’’ on a 5-point semantic differential scale (1 = Lunch, 5 = Dinner). An independent samples t-test revealed that there were significant differences between the lunch condition (M = 1.67, SD = 1.25) and the dinner condition (M = 4.74, SD = .74), with t(203.731) = 23.043, $p < .001$. These results suggest that the manipulation of the meal types was successful.

3.10 Participants

The survey had a total of 404 responses, gathered through non-probability snowball sampling. Figure 5 shows the flowchart of the data cleaning process. According to the discussion in section 3.7, participants that indicated that they eat meat at dinner 0 or 7 days per week were excluded (24 and 47 respectively). Furthermore, 48 respondents were removed for failing to complete the experiment in the online shopping environment, 8 respondents

were removed for selecting unusual products in their shopping cart and 40 respondents were removed because their order numbers could not be matched with the order numbers in the online supermarket. Finally, an outlier analysis revealed five problematic respondents that had been straight lining the survey, these were subsequently removed. Therefore, the data of 232 respondents was subjected to further statistical analyses. An overview of participants' demographic background and randomization check between the conditions can be found in Table 3.

Figure 5.

Flowchart of the Data Cleaning Process

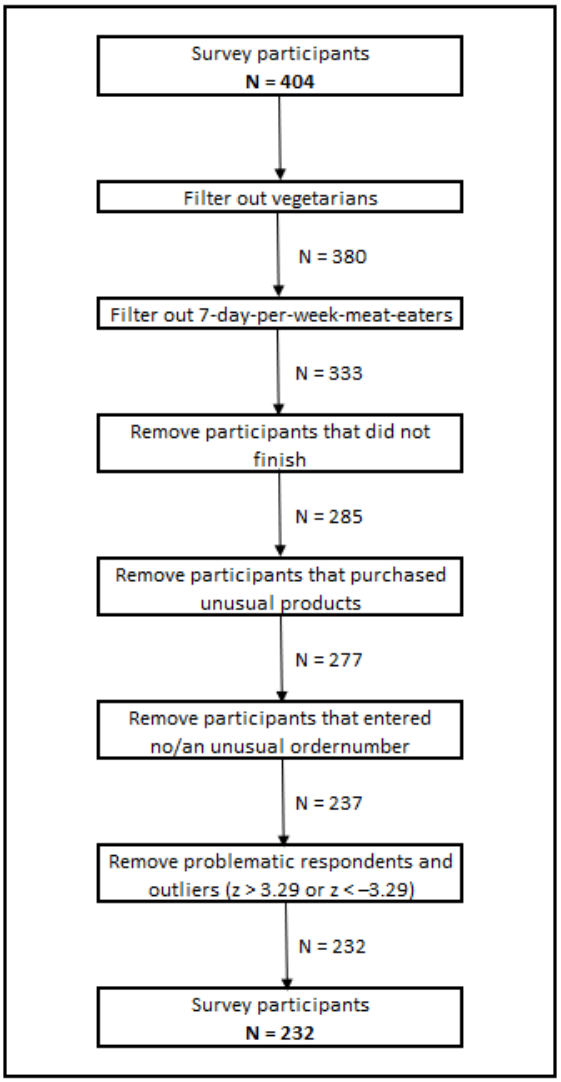


Table 3.

Respondents' Demographic Information and Randomization Check

Condition	Participants		Gender[a]				Age[b]	Education[c]		Meat per week[d]
	Total		Male		Female			Low	High	
	N	%	N	%	N	%	*M (SD)*	N (%)	N (%)	*M (SD)*
Overall	232	100	116	50	116	50	30.3 (14.4)	98 (100%)	134 (100%)	4.7 (1.4)
1 - Dinner/Meat/NormPresent	33	14.2	17	14.7	16	13.8	31.4 (16.2)	12 (12.2%)	21 (15.7%)	4.8 (1.5)
2 - Dinner/Vega/NormPresent	27	11.6	12	10.3	15	12.9	28.3 (13.5)	14 (14.3%)	13 (9.7%)	5.1 (1.1)
3 - Dinner/Meat/NormAbsent	19	8.2	10	8.6	9	7.8	28.4 (11.4)	11 (11.2%)	8 (6.0%)	4.2 (1.5)
4 - Dinner/Vega/NormAbsent	29	12.5	18	15.5	11	9.5	26.6 (8.9)	11 (11.2%)	18 (13.4%)	4.7 (1.4)
5 - Lunch/Meat/NormPresent	33	14.2	17	14.7	16	13.8	33.9 (17.3)	14 (14.3%)	19 (14.2%)	4.7 (1.5)
6 - Lunch/Vega/NormPresent	29	12.5	16	13.8	13	11.2	29 (14.8)	12 (12.2%)	17 (12.7%)	4.5 (1.4)
7 - Lunch/Meat/NormAbsent	31	13.4	12	10.3	19	16.4	32.5 (16.2)	14 (14.3%)	17 (12.7%)	4.7 (1.2)
8 - Lunch/Vega/NormAbsent	31	13.4	14	12.1	17	14.7	30.8 (13.4)	10 (10.2%)	21 (15.7%)	4.7 (1.2)

Note: M - Mean value, *SD* - Standard deviation, [a] - Chi-square, [b] - one-way ANOVA, [c] - Chi-square, [d] - one-way ANOVA.
[a] χ^2 (7, N = 232) = 4.3, p = .743; [b] $F(7, 224) = 0.855$, p = .543.
[c] χ^2 (7, N = 232) = 5.0, p = .660; [d] $F(7, 224) = 0.985$, p = .443.

The average age of respondents was 30.3 (*SD* = 14.4); ages ranged from 15 to 80; 116 participants were female. The average days of meat per week at dinner was 4.7 (*SD* = 1.4), which is in accordance with a research by Kien Onderzoek (2019), who reported an average of 4.6 days of meat per week at dinner. Two chi-square tests of homogeneity showed that there were no significant differences on gender and educational level between the conditions and therefore, distribution across the eight conditions is equal (all $p > .05$). Additionally, two one-way ANOVA tests showed that there were no significant differences on age and days of meat at dinner per week between the conditions and therefore, distribution across the eight conditions is equal (all $p > .05$). These results suggests that the characteristics of the respondents did not differ substantially between the conditions in terms of gender, age, educational level and amount of meat eaten at dinner per week.

3.11 Measures

The questionnaire used for this experiment is conducted using the Qualtrics Experience Management platform (Qualtrics, 2021). The scales utilized are derived from the Marketing Scales Handbook (Bruner, 2009) and various other researches. Please refer to appendix H for the questionnaire and an overview of all scales utilized.

3.11.1 Food choice

The dependent variable food choice was measured on a binary level (0 = vegetarian, 1 = meat). This variable was added to the data manually by checking the shopping cart of each

respondent and registering the type of product that was purchased during the experiment; meat or no meat. To maintain reliability and validity, data was only registered when the order number of the shopping cart corresponded with the order number in the questionnaire.

3.11.2 Attitude towards meat consumption

Attitude towards meat consumption was assessed through a 5-item 9-point semantic differential scale from a study of Berndsen and Van der Pligt (2004), later confirmed to be valid by Eenhoorn (2018). Respondents were asked to rate their attitude towards meat consumption on a 9-point scale on the items 'bad–good', 'unpleasant–pleasant', 'against–for', 'unfavourable–favourable', 'negative–positive'. The results reported a satisfactory internal consistency with Cronbach's Alpha of .92.

3.11.3 Additional measures

Besides the variables in the research model, several additional variables are measured. Attitude towards the recipe was assessed through a 3-item 7-point semantic differential scale. The items are derived from a scale from Aschemann-Witzel and Grunert (2015). Respondents were asked to rate their attitude towards the recipe, for the recipe they were initially presented with, for 3 items on a 7-point scale. For example, ''I would ….. eating this recipe'' (1 = Dislike, 7 = Like). The results reported a satisfactory internal consistency with Cronbach's Alpha of .84.

Likelihood to try the recipe was assessed through a 4-item 7-point Likert scale. The items are derived from a scale from Sundar and Kayanaraman (2004). Respondents were asked to rate the likelihood to try the recipe, for the recipe they were initially presented with, for 4 items on a 7-point scale. For example, ''How likely are you to taste the recipe initially presented with?'' (1 = Very unlikely, 7 = Very likely). The results reported a satisfactory internal consistency with Cronbach's Alpha of .95.

Social desirability of eating meat was assessed through a 4-item 7-point Likert scale. This variable measures the degree to which the participant believes consuming meat is socially acceptable. The items are derived from a scale from Ding, Grewal and Liechty (2005). Respondents were asked to rate their social desirability of eating meat for 4 items on a 7-point scale. For example, ''I think it is socially desirable to eat meat.'' (1 = Totally disagree, 7 = Totally agree). The results reported a satisfactory internal consistency with Cronbach's Alpha of .87.

Enjoyment of eating meat was assessed through a 7-item 7-point Likert scale. The items are derived from a scale from Audebert, Deiss and Rousset (2006). Respondents were

asked to rate their enjoyment of eating meat for 7 items on a 7-point scale. For example, ‘’I get pleasure from eating meat.’’ (1 = Totally disagree, 7 = Totally agree). Two items were reverse coded. The results reported a satisfactory internal consistency with Cronbach’s Alpha of .92.

3.12 Factor analysis and reliability analysis

A factor analysis using the principal components method with varimax rotation was performed to test the validity of the constructs. The Kaiser-Meyer-Olkin measure of sampling adequacy was .872 and Bartlett’s Test of Sphericity was significant (χ^2 (253) = 4406.50, $p <$ .001), as such, all items proved suitable for factor analysis. The factor analysis extracted a total of five components with eigenvalues of above 1, explaining a total of 77.13% of the variance. Nearly every item loaded clearly into the constructs they intended to measure, except for one item measuring attitude towards meat consumption, which loaded equally on two components. This indicates that the item not valid, as it did not measure what it was supposed to measure. The item was removed and the remaining 22 items were all cleanly explained across the five components with primary factor loadings of above .70. Subsequently, a reliability analysis was performed to assess the internal consistency of the measures. Cronbach’s Alpha was above the threshold of .70 for all measures, therefore confirming sufficient internal consistency. An overview of the results of the factor analysis and reliability analyses can be found in Table 4.

Table 4.

Factor Analysis with Varimax Rotation

Construct	α	Item	Components				
			1	2	3	4	5
Enjoyment of eating meat	.92	I like the appearance of meat and I like to eat it too	.86				
		I like the smell of meat and I like to eat it too	.82				
		I dislike the appearance of meat*	.79				
		Eating meat is a pleasant experience	.77				
		The smell of meat is very unpleasant*	.75				
		I get pleasure from eating meat	.71				
		I get pleasure from eating meat, even if I am alone	.71				
Attitude towards meat consumption	.92	Unfavourable / Favourable		.86			
		Bad / Good		.85			
		Negative / Positive		.85			
		Against / For		.79			
Likelihood to try the recipe	.95	How likely are you to try the recipe initially presented with?			.94		
		How likely are you to cook the recipe initially presented with?			.92		
		How likely are you to taste the recipe initially presented with?			.89		
		How likely are you to buy the ingredients for the recipe initially presented with?			.85		
Social desirability of eating meat	.87	My friends think eating meat is socially desirable				.88	
		My family thinks eating meat is socially desirable				.85	
		There is a general perception that eating meat is socially desirable				.79	
		I think eating meat is socially desirable				.79	
Attitude towards the recipe	.84	I would be .... eating this recipe (Strongly against / Strongly for)					.85
		Eating this recipe would be (Extremely bad / Extremely good)					.82
		I would .... eating this recipe (Dislike / Like)					.74
		Explained variance	33.77%	18.46%	11.43%	7.93%	5.5%
		Eigenvalue	7.43	4.06	2.51	1.75	1.22

Note: * Recoded item

4. Results

In the following section, the results of the statistical analyses will be presented.

4.1 Multivariate analysis of variance

A Multivariate Analysis of Variance (MANOVA) was performed to examine the main effects of the independent variables on all dependent variables. The MANOVA revealed that the default option nudge had a statistically significant main effect on all dependent variables, with $\Lambda = .754$, F (2, 223) = 36.283, $p < .001$. No statistically significant result was found for the effect of the descriptive norm nudge on all dependent variables, with $\Lambda = .994$, F (2, 223) = 0.638, $p = .529$ and for the effect of meal type on all dependent variables, with $\Lambda = .995$, F (2, 223) = 0.518, $p = .597$. Furthermore, the MANOVA revealed a statistically significant interaction effect between meal type and the default option on all dependent variables, with $\Lambda = .972$, F (2, 223) = 3.263, $p = .04$. Additionally, no further statistically significant interaction effects on the dependent variables were found. Following the results of the MANOVA, several Univariate Analyses of Variance (ANOVA) were performed in order to examine the effects of the independent variables on the individual dependent variables. An overview of the MANOVA and ANOVA results can be found in table 5.

Table 5.

Results of Multivariate Analysis of Variance and Univariate Analyses of Variance

	MANOVA				ANOVA			
					Food Choice[a]		Attitude Towards Meat Consumption[b]	
Effect	**Wilks' Lambda**	***F* value**	**df**	***p***	***F* value**	***p***	***F* value**	***p***
Default Option	.754	36.283**	2, 223	.001	60.582**	.001	0.026	.873
Descriptive Norm	.994	0.638	2, 223	.529	1.278	.260	0.182	.670
Descriptive Norm x Default Option	.976	2.745	2, 223	.066	5.514*	.020	1.000	.319
Meal Type	.995	0.518	2, 223	.597	0.984	.322	0.407	.524
Meal Type x Default Option	.972	3.263*	2, 223	.040	6.556*	.011	1.203	.274
Meal Type x Descriptive Norm	.996	0.414	2, 223	.662	0.013	.908	0.751	.387
Meal Type x Default Option x Descriptive Norm	.995	0.551	2, 223	.577	0.863	.354	0.002	.962

Note: * $p < .05$. ** $p < .005$.

[a] $R^2 = .271$; [b] $R^2 = .015$

4.2 Main effects

4.2.1 Default option

Besides the MANOVA results that found a statistically significant main effect of the default option nudge relating to all dependent variables, separate univariate ANOVA tests revealed that food choice was significantly lower for respondents that were presented with a vegetarian recipe set by default ($F = 60.582$, $p < .001$). There was no statistically significant effect found for attitude towards meat consumption ($F = 0.026$, $p < .873$). Therefore, the default option nudge had an effect in the expected direction for food choice, but not for attitude towards meat consumption. As such, H1a is supported and H1b is not supported. An overview of the mean values and standard deviation values for food choice and attitude towards meat consumption manipulated by the default option nudge can be found in Table 6.

Table 6.

Mean and Standard Deviation Values for the Main Effects of the Default Option Nudge

	Default option	
	Vegetarian	**Meat**
Food choice[a]*	0.25 (0.44)	0.72 (0.45)
Attitude towards meat consumption[b]	5.90 (1.72)	5.98 (1.73)

Note: * $p < .001$. Standard deviation in parentheses

[a] - Dichotomous scale: 0 = vegetarian, 1 = meat; [b] - Semantic differential scale: 1 to 9.

4.2.2 Descriptive norm

Additionally, besides the MANOVA results that found no statistically significant main effect between the descriptive norm relating to all dependent variables, separate univariate ANOVA tests did also not find any statistically significant effects on the individual dependent variables, food choice ($F = 1.278$, $p < .260$) and attitude towards meat consumption ($F = 0.182$, $p < .670$). Therefore, the descriptive norm nudge did not have the expected effects. As such, H2a and H2b are not supported. For reason of completeness, an overview of the mean values and standard deviation values for food choice and attitude towards meat consumption manipulated by the descriptive norm nudge can be found in Table 7.

Table 7.

Mean and Standard Deviation Values for the Main Effects of the Descriptive Norm Nudge

	Descriptive norm	
	Present	**Absent**
Food choice	0.53 (0.50)	0.44 (0.50)
Attitude towards meat consumption	5.98 (1.74)	5.90 (1.72)

Note: Standard deviation in parentheses

[a] - Dichotomous scale: 0 = vegetarian, 1 = meat; [b] – Semantic differential scale: 1 to 9.

4.3 Interaction effects

4.3.1 Descriptive norm x Default option

Furthermore, while the MANOVA found no statistically significant interaction effect between the descriptive norm nudge and the default option nudge relating to all dependent variables, separate univariate ANOVA tests revealed a statistically significant effect on food choice, with $F = 5.514$, $p = .02$. There was no statistically significant effect found for attitude towards meat consumption.

To verify these results, a moderation analysis was performed using version 3.5.3 of Hayes' (2020) PROCESS macro extension for SPSS. Model 1 was used to test simple moderation. A statistically significant interaction effect between the default option nudge and the descriptive norm nudge on food choice ($\beta = 1.287$, 95% CI [0.968, 2.477], $z = 2.12$, $p = .034$) was found, indicating that the relationship between the default option nudge and food choice is moderated by the descriptive norm nudge. No statistically significant effect was found for the interaction between the default option nudge and the descriptive norm nudge on attitude towards meat consumption ($\beta = 0.435$, 95% CI [-0.466, 1.336], $t = 0.95$, $p = .342$). These results are in line with the MANOVA and ANOVA results.

To put into perspective, the means plot for the interaction between the descriptive norm and the default option on food choice is presented in Figure 6. The conditions with a vegetarian recipe set by default containing a vegetarian descriptive norm exhibit lower mean scores – and thus, more vegetarian purchases - compared to the conditions with a vegetarian recipe not containing a vegetarian descriptive norm. In contrast, the conditions with a meat recipe set by default containing a vegetarian descriptive norm exhibit higher mean scores – and thus, more meat purchases - compared to the conditions with a meat recipe not containing a vegetarian descriptive norm. Hence, a vegetarian descriptive norm seems to reinforce the effect of the default option nudge. As such, H3a is supported and H3b is not supported. The occurred interaction effect is called a synergistic interaction effect (Ford, 2016). An overview of the mean differences of this interaction effect can be found in appendix I.

4.3.2 Meal type x Default option

Complementary to the MANOVA results that found a statistically significant interaction effect between the meal type and the default option nudge relating to all dependent variables, separate univariate ANOVA tests revealed a statistically significant interaction effect on food choice, with $F = 6.556$, $p = .011$. There was no statistically significant effect found for attitude towards meat consumption.

To verify these results, a second moderation analysis was performed using version 3.5.3 of Hayes' (2020) PROCESS macro extension for SPSS. Model 1 was used to test simple moderation. A statistically significant interaction effect between the default option nudge and meal type on food choice (β = 1.435, 95% CI [0.223, 3.646], z = 2.32, p = .02) was found, indicating that the relationship between the default option nudge and food choice is moderated by the meal type. No statistically significant effect was found for the interaction between the default option nudge and meal type on attitude towards meat consumption (β = 0.433, 95% CI [-0.465, 1.331], t = 0.95, p = .343). These results are in line with the MANOVA and ANOVA results.

To put into perspective, the means plot for the interaction between the meal type and the default option on food choice is presented in Figure 7. The conditions with a vegetarian lunch recipe set by default exhibit lower mean scores – and thus, more vegetarian purchases – compared to the conditions with a vegetarian dinner recipe set by default. In contrast, the conditions with a meat lunch recipe set by default exhibit higher mean scores – and thus, more meat purchases – compared to the conditions with a meat dinner recipe set by default. Hence, a lunch recipe seems to reinforce the effect of the default option nudge. As such, H4a is supported and H4b is not supported. Similar to the interaction between the descriptive norm nudge and the default option nudge, this interaction effect is called a synergistic interaction (Ford, 2016). An overview of the mean differences of this interaction effect can be found in appendix J.

4.3.3 Meal type x Descriptive norm

Finally, besides the MANOVA results that found no statistically significant interaction effect between the meal type and the descriptive norm nudge relating to all dependent variables, separate ANOVA tests did also not find any statistically significant effects on the individual dependent variables. To verify these results, a third moderation analysis was performed using version 3.5.3 of Hayes' (2020) PROCESS macro extension for SPSS. Model 1 was used to test simple moderation. No statistically significant effects were found for the interaction between the descriptive norm nudge and meal type (β = -0.110, 95% CI [-1.152, 0.932], z = -0.207, p = .836) on food choice, and on attitude towards meat consumption (β = -0.339, 95% CI [-1.240, 0.563], t = -0.74, p = .460). These results are in line with the MANOVA and ANOVA results. As such, H5a and H5b are not supported.

Figure 6.

Means Plot Interaction Between Descriptive Norm and Default Option for Food Choice

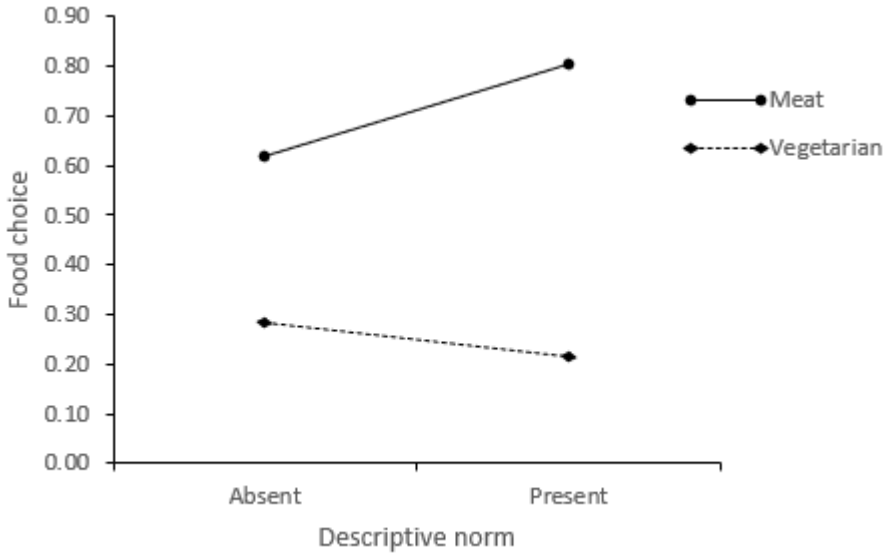
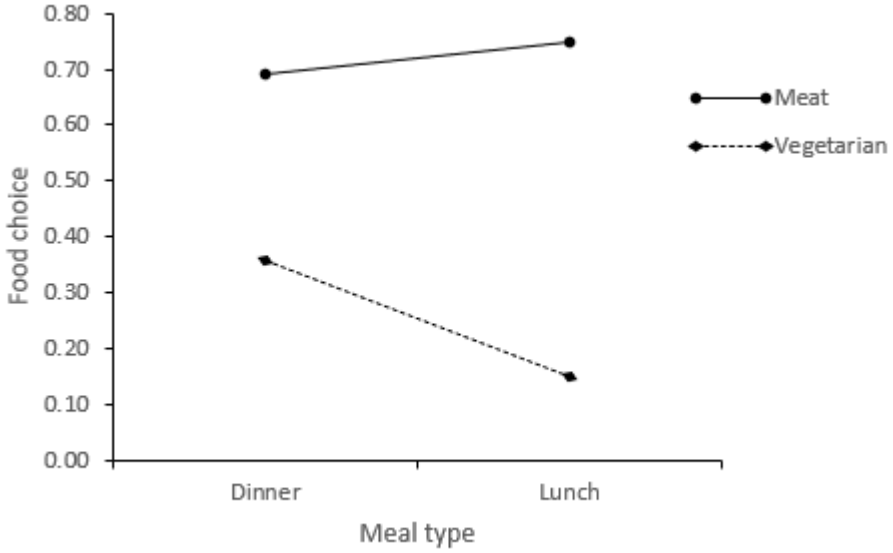


Figure 7.

Means Plot Interaction Between Meal Type and Default Option for Food Choice



4.4 Additional analyses

To explore effects that were not hypothesized, additional analyses were performed.

4.4.1 Effects of socio-demographic variables

Another Multivariate Analysis of Variance (MANOVA) was performed to examine the effects of the socio-demographic variables on all dependent variables and the interaction effects between the socio-demographic variables and independent variables on all dependent variables. The MANOVA revealed a statistically significant effect on all dependent variables for gender, $\Lambda = .925$, F (2, 211) = 8.588, $p < .001$, for education level, $\Lambda = .965$, F (2, 211) = 3.850, $p = .023$, and for meat per week, $\Lambda = .772$, F (2, 211) = 31.205, $p < .001$. No statistically significant result was found for the effect age on all dependent variables, $\Lambda = .996$, F (2, 211) = 0.441, $p = .644$. Furthermore, the MANOVA revealed a statistically significant interaction effect between age and meal type on all dependent variables, $\Lambda = .968$, F (2, 211) = 3.537, $p = .031$. No further statistically significant interaction effects on the dependent variables were found.

Complementary to these MANOVA results, separate univariate ANOVA tests were performed in order to examine the individual effects on the dependent variables. The univariate ANOVAs revealed statistically significant results for the effects of gender on attitude towards meat consumption, $F = 17.241$, $p < .001$, education level on attitude towards meat consumption, $F = 6.951$, $p = .009$, and meat per week on both food choice, $F = 21.047$, $p < .001$, as on attitude towards meat consumption, $F = 57.792$, $p < .001$. Additionally, the univariate ANOVAs revealed statistically significant results for the interaction effects between age and meal type on attitude towards meat consumption, $F = 4.457$, $p = .036$, between education level and the default option nudge on food choice, $F = 4.025$, $p = .046$, between education level and the descriptive norm nudge on food choice, $F = 4.774$, $p = .030$, and between meat per week and the default option nudge on food choice, $F = 4.032$, $p = .046$. Inclusion of socio-demographics as predictor variables improved explained variance from 27.1% to 40.2% for food choice and from 0.15% to 34.4% for attitude towards meat consumption, which is quite a strong improvement especially for attitude towards meat consumption. An overview of the MANOVA and ANOVA results for the effects of the socio-demographic variables can be found in table 8. An overview of the mean differences for gender, education level and meat per week can be found in appendix K.

Table 8.

Results of Multivariate Analysis of Variance and Univariate Analyses of Variance Including Socio-demographics

	MANOVA				ANOVA			
	Wilks'				Food Choice[a]		Attitude Towards Meat Consumption[b]	
Effect	**Lambda**	***F* value**	**df**	***p***	***F* value**	***p***	***F* value**	***p***
Gender	.925	8.588***	2, 211	.001	2.189	.140	17.241***	.001
Age	.996	0.441	2, 211	.644	0.006	.939	0.831	.363
Education level	.965	3.850*	2, 211	.023	2.897	.090	6.951**	.009
Meat per week	.772	31.205***	2, 211	.001	21.047***	.001	57.792***	.001
Gender x Default option	.995	0.558	2, 211	.573	0.124	.725	0.686	.409
Gender x Descriptive norm	.987	1.342	2, 211	.264	0.452	.502	2.676	.103
Gender x Meal type	.989	1.181	2, 211	.309	1.857	.174	1.267	.262
Age x Default option	.994	0.621	2, 211	.538	1.244	.266	0.181	.671
Age x Descriptive norm	.983	1.862	2, 211	.158	0.672	.413	1.922	.167
Age x Meal type	.968	3.537*	2, 211	.031	0.714	.399	4.457*	.036
Education level x Default option	.973	2.899	2, 211	.057	4.025*	.046	0.372	.543
Education level x Descriptive norm	.977	2.532	2, 211	.082	4.774*	.030	0.035	.851
Education level x Meal type	.998	0.170	2, 211	.844	0.267	.606	0.182	.670
Meat per week x Default option	.980	2.108	2, 211	.124	4.032*	.046	0.054	.817
Meat per week x Descriptive norm	.996	0.391	2, 211	.677	0.784	.377	0.069	.793
Meat per week x Meal type	.981	2.066	2, 211	.129	2.454	.119	3.045	.082

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

[a] $R^2 = .402$; [b] $R^2 = .344$

4.4.2 Additional variables

Besides the dependent variables included in the research model, several additional interesting variables were measured. ANOVA tests were performed to examine the effects of the independent variables on these additional dependent variables. The ANOVAs revealed statistically significant results for the effects of the default option nudge on attitude towards the recipe, $F = 4.813$, $p = .029$, and meal type on enjoyment of eating meat, $F = 4.136$, $p = .043$. No further effects were found. Results of the ANOVA tests can be found in table 9.

Table 9.

Results of Univariate Analyses of Variance

	ANOVA							
	Attitude towards the recipe[a]		Likelihood to try the recipe[b]		Social desirability of eating meat[c]		Enjoyment of eating meat[d]	
Effect	***F* value**	***p***	***F* value**	***p***	***F* value**	***p***	***F* value**	***p***
Default Option	4.813*	.029	0.468	.468	0.001	.979	0.682	.410
Descriptive Norm	0.426	.515	0.107	.744	0.932	.335	0.018	.893
Descriptive Norm x Default Option	0.023	.879	0.001	.978	1.197	.275	1.543	.215
Meal Type	0.719	.397	0.051	.821	0.011	.916	4.136*	.043
Meal Type x Default Option	0.002	.961	0.323	.571	0.264	.608	0.502	.497
Meal Type x Descriptive Norm	0.001	.984	0.314	.576	1.241	.266	0.310	.578
Meal Type x Default Option x Descriptive Norm	0.180	.672	2.659	.104	0.122	.727	0.029	.865

Note: * $p < .05$.

[a] $R^2 = .029$; [b] $R^2 = .019$; [c] $R^2 = .016$; [d] $R^2 = 0.033$

4.5 Overview of tested hypotheses

An overview of the tested hypotheses is presented in table 10.

Table 10.

Summary of the Hypotheses

Hypotheses		**Result**
H1	When consumers are confronted with a vegetarian recipe set by default, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are confronted with a meat recipe set by default.	H1a Supported. H1b Not supported.
H2	When consumers are confronted with a vegetarian descriptive norm, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are not confronted with a vegetarian descriptive norm.	H2a Not supported. H2b Not supported.
H3	When consumers are confronted with a vegetarian recipe set by default containing a vegetarian descriptive norm, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are confronted with a vegetarian recipe set by default not containing a vegetarian descriptive norm.	H3a Supported. H3b Not supported.
H4	When consumers are presented with a lunch recipe and are presented with a vegetarian recipe by default, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are presented with a dinner recipe.	H4a Supported. H4b Not supported.
H5	When consumers are presented with a lunch recipe and are presented with a vegetarian descriptive norm, this will lead to **(a)** more vegetarian product purchases and **(b)** a less positive attitude towards meat consumption compared to when consumers are presented with a dinner recipe.	H5a Not supported. H5b Not supported.

5. Discussion

5.1 Discussion of results

The aim of this study was to investigate if nudges can be applied to decrease meat consumption by nudging consumers towards sustainable consumption. This was investigated in order to contribute to reducing GHG emissions in the livestock sector. Therefore, this study tested if the default option nudge and the descriptive norm nudge had an effect on food choice and attitude towards meat consumption and whether these effects were moderated by the descriptive norm nudge and meal type. The research questions are answered by discussing the results.

5.1.1 Discussion of main effects

Default option

This study investigated whether a vegetarian recipe set by default would yield more vegetarian food choices and a less positive attitude towards meat consumption compared to a meat recipe set by default. Based on the findings from Campbell-Arvai et al. (2014), who investigated the effects of the default option nudge on sustainable consumption, it was expected that respondents who were assigned to a vegetarian recipe set by default were more likely to choose a vegetarian product compared to those who were assigned to a meat recipe set by default. Results show that respondents assigned to the vegetarian default option exhibited more vegetarian purchases compared to respondents assigned to the meat default option, which is in line with the results of previous studies and supports the assertion that the default option nudge is an effective instrument for motivating behaviour. As discussed in section 2.4, these effects can be explained with several different theories. First, respondents might not have noticed that they had to make a choice, and therefore unconsciously chose for the default option. Second, respondents might have assumed that the default option was the recommended choice and therefore went with it (Keller et al., 2011). Third, respondents chose the default option to avoid investing time (Johnson & Goldstein, 2003; Keller et al., 2011), which can be attributed to economic choice theory (Becker, 1965). Finally, respondents might have preferred accepting the default option rather than choosing themselves and regretting their own decision later on (Ritov & Baron, 1992). This could be attributed to the loss-aversion bias (Tversky & Kahneman, 1992), which holds the idea that losing something feels worse than gaining something of the same amount. According to Dinner et al. (2011), who successfully nudged consumers towards more sustainable lightbulbs, it is unlikely that any one of these theories individually explains the effects of the default option across all

situations. It is more likely that all of these theories contribute, with the strength of each theory depending on the situation. As such, this finding adds to the growing body of evidence of the effectiveness of the default option nudge, especially on sustainable consumption. This, in turn, could contribute to decreasing meat consumption and therefore GHG emission in the livestock sector.

Additionally, since nudging could be classified as persuasion through the peripheral route (Booth-Butterfield, 2016), and the Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986) states that this route can influence attitudes, it was expected that respondents who were assigned to a vegetarian recipe set by default would indicate a less positive attitude towards meat consumption compared to those who were assigned to a meat recipe set by default. Results show that attitude towards meat consumption was not influenced by the default option nudge. According to Sunstein (2016), nudges can be classified as System 1 or System 2 nudges. System 1 nudges target automatic processing in order to persuade, like the default option nudge, while System 2 nudges target rational processes (Stanovich, 2000), and use, for example, statistical information to persuade. Since the default option nudge can be seen as a System 1 nudge (Sunstein, 2016), targeting automatic processing, it could be easier to subconsciously or unconsciously affect customer decisions. Furthermore, Cadario and Chandon (2020) classified the default option nudge as a behaviourally oriented nudging intervention and concluded that a behaviourally oriented nudging intervention is estimated to be 3.2 times as effective on behaviour as on beliefs. Finally, Ambuehl et al. (2014) provided evidence that System 1 nudges, like the default option, can be more effective in altering what people actually do, and System 2 nudges can influence beliefs without affecting behaviour. Therefore, the respondents in this study might also be effectively nudged towards a vegetarian food choice, without affecting their actual attitude towards meat consumption.

Descriptive norm

The second main effect this study investigated was whether a vegetarian descriptive norm would yield more vegetarian food choices and a less positive attitude towards meat consumption compared to when this norm was absent. Based on findings from previous studies investigating the effects of the descriptive norm nudge on sustainable behaviour (Goldstein et al., 2008; Nolan et al., 2008; Demarque et al., 2015), it was expected that respondents who were presented with a vegetarian descriptive norm were more likely to choose a vegetarian product and have a lower attitude towards meat consumption compared to those who were not presented with a norm. Results show that both food choice and attitude

towards meat consumption were not influenced by the descriptive norm nudge. This disagreement with results from previous studies may be explained by the fact that the descriptive norms were only present during the recipe selection, and not present during the actual behavioural act. Kallgren et al. (2000) stated that the ability of norms to affect behaviour is tied to the norm being deliberately present during the actual behaviour. Since descriptive norms are used to inform about what the majority of others do in similar circumstances, the influence of these norms may weaken as soon as consumers move out of the environment in which the norms were made salient. Although the eye-tracking usability test conducted in this study confirmed the salience of the descriptive norm during the recipe selection, respondents moved out of this selection environment before performing the actual behaviour of choosing the food products. Therefore, this may be a possible explanation. Kallgren et al. (2000) describe that moving out of the environment in which the norm was made salient, would only affect the use of descriptive norms, but not the effect of injunctive norms. As injunctive norms describe what most others approve or disapprove, these are less likely to change depending on the situation and should transcend environments. Therefore, future research could conduct a similar research using an injunctive norm instead of a descriptive norm.

5.1.2 Discussion of interaction effects

Descriptive norm x default option

Based on findings from previous studies on the use of multiple nudging interventions (Hohle, 2014; Wilson, et al., 2016; Ingendahl et al., 2020), it was expected that the use of a vegetarian default option would be more effective when a vegetarian descriptive norm was present as well. Results show that respondents assigned to the vegetarian recipe set by default containing a vegetarian descriptive norm exhibited most vegetarian purchases; even more than a single vegetarian-default option intervention. This finding is in line with the results of previous studies (Kallgren et al., 2000; Hohle, 2014; Ingendahl et al., 2020), that indicated an interaction effect between these two nudges as well. Therefore, this result supports the assertion that the default option nudge is even more effective in motivating behaviour when combined with a descriptive norm nudge. Furthermore, results show that respondents assigned to a meat recipe set by default containing a vegetarian descriptive norm exhibit most meat purchases; even more than a single meat-default option intervention. This indicates that a vegetarian descriptive norm reinforces the effect of the default option nudge, regardless of the default setting. This finding is perfectly in line with a similar finding of Kallgren et al. (2000),

who reported that descriptive norms increased littering behaviour in a littered environment, but decreased littering behaviour in a clean environment. Moreover, the finding can be attributed to the fact that customers tend to choose the easiest option, which is created using a combined nudging intervention (Kahneman, 2003). This in turn, demonstrates the effectiveness of a combined nudging intervention. As such, this finding adds to the growing body of evidence of the effectiveness of a combination of multiple nudging interventions on behaviour. More specifically, it contributes to the evidence of the effectiveness of a combination of the descriptive norm nudge and the default option nudge on behaviour. This, in turn, could contribute to decreasing meat consumption and therefore GHG emission in the livestock sector. No effect was found on attitude towards meat consumption. This might be explained by the nature of the method of how food choice and attitude towards meat consumption are determined. Food choice is determined by barely a few clicks in a web browser and therefore, this might be seen as a rather subconscious or unconscious process. In contrast, indicating one's attitude towards meat consumption could be seen as a rather active cognitive process. As previously stated in section 5.1.1, this could be attributed to the fact that different nudges could have different effects on behaviour than on beliefs (Ambuehl et al., 2014; Sunstein, 2016; Cadario & Chandon, 2020). This would explain why there is an effect on food choice but not on attitude towards meat consumption.

Meal type x default option

Situational factors that have proven to influence sustainable consumption are; eating situation, like eating alone or eating with others; eating place, like eating out or eating at home; and day of the week (Horgan et al., 2019). A situational factor that was not yet tested in the context of sustainable consumption is meal type. According to Winkler et al. (1999), dinner appeared to be the most stable and fixed eating event while lunch appeared to be the most flexible eating event for consumers. Therefore, it was expected that nudging respondents that were presented with a lunch recipe default setting would be more effective compared to nudging respondents that were presented with a dinner recipe default setting. Results show that meal type individually did not effectively influence food choice or attitude towards meat consumption. However, results between the interaction of meal type and the default option nudge show that respondents that were presented with a vegetarian lunch recipe exhibited more vegetarian purchases compared to respondents that were presented with a vegetarian dinner recipe. This finding is in accordance with this studies' expectations based on the literature (Winkler et al., 1999), indicating an interaction effect between these variables.

Therefore, this result supports the assertion that a vegetarian default option nudge, is even more effective in motivating sustainable behaviour when combined with a lunch recipe. This effect could be attributed to the fact that lunch is a more flexible eating event than dinner (Winkler et al., 1999). Furthermore, results show that respondents that were presented with a meat lunch recipe exhibited more meat purchases compared to respondents that were presented with a meat dinner recipe. This indicates that a lunch recipe reinforces the effect of the default option nudge, regardless of the default setting, and that there is indeed an interaction effect present between the meal type and the default option nudge on food choice. Therefore, it can be concluded that the default option nudge has an enhanced effect when combined with a lunch recipe. As such, these findings add to the gap of the effects of situational factors on sustainable consumption and to the gap of the interaction between meal type and the default option nudge on sustainable consumption. This, in turn, could contribute to decreasing meat consumption during lunch, and therefore decreasing GHG emission in the livestock sector. Again, no effect was found on attitude towards meat consumption, which could be explained by the fact that the default option could be classified as a System 1 nudge and System 1 nudges have proven more effective on actual behaviour instead of beliefs (Ambuehl et al., 2014; Sunstein, 2016; Cadario & Chandon, 2020).

Meal type x descriptive norm

Based on the same arguments stated for the interaction effect between meal type and the default option nudge (Winkler et al., 1999; Horgan et al., 2019), it was expected that nudging respondents that were presented with a lunch recipe containing a vegetarian descriptive norm would be more effective compared to nudging respondents that were presented with a dinner recipe containing a vegetarian descriptive norm. However, no interaction effect was found between meal type and the descriptive norm nudge. This could be attributed to the fact that even a single descriptive norm nudge in this study did not have an effect on food choice or attitude towards meat consumption. Therefore, when moderated by meal type, which was hypothesized to enhance the effect of the descriptive norm nudge, this equally had no effects. Furthermore, another reason for this may be the same as the reason stated in section 5.1.1, namely that the ability of norms to affect behaviour is tied to the norm being deliberately present during the actual behaviour (Kallgren et al., 2000), even when meal type is taken into account. Although the eye-tracking usability test conducted in this study confirmed the salience of the descriptive norm during the recipe selection, respondents moved out of this selection environment before performing the actual behaviour of choosing the food

products. Since injunctive norms are less likely to change depending on the situation and are more probable to transcend environments, future research could examine the interaction effect between meal type and an injunctive norm instead of a descriptive norm.

5.1.3 Discussion of socio-demographic effects and additional variables

Based on the idea that attitude towards food in general is formed according to an individual's particular background, cultural and social setting, timing of experiences (Bourdieu, 1984; Fischler, 1988; Devine & Olson, 1991, as cited in Furst et al., 1996), and socio-demographics (Kalof et al., 1999; Janda & Trocchia, 2001; Kubberød et al., 2002; Guenther et al., 2005), the effects of several socio-demographic variables were briefly investigated. Results show that males exhibited a more positive attitude towards meat consumption than females. Therefore, this result supports prior work of the influence of gender on attitude towards meat consumption (Kalof et al., 1999; Janda & Trocchia, 2001; Kubberød et al., 2002). Additionally, results show that respondents with a lower education level exhibited more positive attitudes towards meat consumption compared to respondents with a higher education. This finding is in accordance with Guenther et al. (2005), who found that respondents with a higher education level exhibited a lower likelihood of consuming meat. Finally, results show that the amount of meat eaten at dinner per week has an effect on food choice. This finding could be attributed to the fact that habit has an important role in predicting consumption behaviour (Saba & Di Natale, 1998; Rees et al., 2018). In general, by adding socio-demographics as predictor variables, explained variance was improved substantially, especially for attitude towards meat consumption. Therefore, the effects on attitude towards meat consumption can for a considerable amount be explained with socio-demographic variables instead of the nudging interventions. Food choice was less affected by socio-demographics and most effects can be attributed to the nudging interventions. This might explain why no effects on attitude towards meat consumption were found while there were several effects on food choice.

Some additional dependent variables within the scope of meat consumption were analysed to give further insights. Results show that the respondents assigned to a vegetarian default option had a more positive attitude towards the recipe compared to respondents assigned to a meat default option. Furthermore, results show that respondents assigned to a dinner recipe reported a higher score for enjoyment of eating meat compared to respondents assigned to a lunch recipe.

5.2 Implications

5.2.1 Managerial implications

This research was conducted to investigate if nudges can be used to decrease meat consumption by nudging consumers towards sustainable consumption. This was investigated in order to contribute to reducing GHG emissions in the livestock sector. Therefore, this study tested if the default option nudge and the descriptive norm nudge had an effect on food choice and attitude towards meat consumption and whether these effects were moderated by the descriptive norm nudge and meal type. Generally, the results of this study show that by presenting consumers with a vegetarian recipe instead of a meat recipe, consumers can be nudged towards choosing a recipe more environmentally sustainable. These findings could be used in the design of interventions and development of policies in order to reduce meat consumption and to further aid the promotion of sustainable consumption. For instance, in terms of applying this finding, policy makers and recipe providers like restaurants, writers of cooking books, or even food magazines such as de Allerhande – a monthly magazine in the Netherlands, containing recipes as an inspiration - can provide recipes with more sustainable products as a default setting in their magazines instead of meat products. Such recipe providers can still offer a wide variety of recipes while providing easier access to environmentally sustainable food options. Additionally, vegetarian or vegetables producers could apply these findings by improving the promotion of their products accordingly, for example, by featuring vegetarian recipes as default recipes in food magazines. Furthermore, the results of this study show that the effect of the default option nudge can be improved by adding a vegetarian descriptive norm to the recipe. Therefore, these policy makers and recipe providers could further improve the effectiveness of sustainable recipes by adding such a norm as well. Finally, the results of this study show that the effects of the default option nudge are greater for lunch recipes than for dinner recipes. Therefore, lunch providers might benefit the most from these findings. Ultimately, such implications could contribute to decreasing meat consumption globally, which would contribute to decreasing GHG emission in the livestock sector.

5.2.2 Scientific implications

Although the effect of the default option nudge and the descriptive norm nudge have been widely explored in the offline environment, not nearly as much research on nudges in a digital environment has been performed. Therefore, this research contributes to the literature on digital nudging. Furthermore, the results of this study add to the existing body of the use of

the default option nudge and the use of the descriptive norm nudge, specifically for the use of nudging towards sustainable consumption. Moreover, these results add to the gap of testing different nudging combinations (Bonini et al., 2018; Cheung, et al., 2019), specifically, the combination of the default option nudge and the descriptive norm nudge (Campbell-Arvai et al., 2014). Finally, the study contributes to the understudied research fields of green nudging (Lindström, 2015) and sustainable consumption (Reisch & Thøgersen, 2015).

Previous research already found effects of the default option nudge (Campbell-Arvai et al., 2014), the descriptive norm nudge (Goldstein et al., 2008; Nolan et al., 2008; Demarque et al., 2015) and combinations of these (Hohle, 2014; Ingendahl et al., 2020) on sustainable behaviour. However, no research was done yet on the effects meal type in combination with these nudges. This study was the first to test meal type as a situational factor that moderates the effects of nudges on food choice and attitude towards meat consumption. Therefore, this study adds to the body of research of the effects of situational factors on food choice and attitude towards meat consumption. Furthermore, it initiated a new moderator for the effects of nudging interventions on sustainable consumption for further investigation. Findings can be used as the foundation to further investigate the effects between meal type and different nudging interventions.

Finally, this study contributes to motivating sustainable consumption to reverse the nutrition transition (Popkin, 2001) by studying the how nudging interventions can be used to decrease meat consumption.

5.3 Limitations and recommendations for future research

Several limitations have been acknowledged and should be taken into consideration. First of all, despite the positive results, the extent to which the default option nudge can retain behaviour change over a longer period of time remains unclear. This study tested behaviour change on the basis of a rather immediate decision. Therefore, future research could study the effects of the default option nudge over a longer period of time. Consumers might change their opinion on the chosen recipe and be less likely to go along with the default recipe when presented with a second time.

Secondly, past research has distinguished social norms into two types, injunctive norms and descriptive norms (Cialdini et al., 1990). Since descriptive norms have proven to be most effective when changing behaviour (Melnyk et al, 2010), this research made use of descriptive norms only. Furthermore, Kallgren et al. (2000) describe that the influence of descriptive norms may weaken as soon as consumers move out of the environment in which

the norms were made salient. Although the eye-tracking usability test conducted in this study indicated the salience of the descriptive norm during the recipe selection, respondents moved out of this selection environment before performing the actual behaviour of choosing the food products. Since injunctive norms are less likely to change depending on the situation and are more probable to transcend environments, future research could investigate the effects of injunctive norms in combination with the default option nudge on sustainable consumption.

Similarly, this study investigated the effects of a vegetarian descriptive norm. Since results showed that this vegetarian descriptive norm improved the effects of the default option nudge in both ways, it would be interesting to investigate the effects of a meat descriptive norm in combination with a default option nudge. Such a descriptive norm might enhance the effects of the default option nudge even further which would be interesting for both meat as vegetarian producers.

Additionally, as past research identified the meal types lunch and dinner as the meals accounting for most food consumption (Fayet et al., 2012) and for most meat consumption (Liang, 1999), the moderating effect of meal type was only tested using these meal types. Future research could investigate the third meal type, breakfast, as a moderator in combination with one or more nudging interventions. Furthermore, the effects of lunch and dinner could be tested in combination with several other nudging interventions besides the default option and the descriptive norm.

Furthermore, while this study tried to establish an environment as realistically as possible, the nature of this study remained hypothetical and the ingredients needed for the chosen recipes were not actually purchased but merely selected. The study lacked any real-world consequences. Therefore, future research could conduct a similar experiment in a more practical context, for example, by making respondents actually purchase the products and preparing the dish. Such a study could provide results with improved interpretability.

Finally, results are limited to two specific nudging interventions. Therefore, they should not be generalized to the effectiveness of other nudging interventions on sustainable consumption. Future research should investigate the effects of other nudging interventions and the interaction between them on sustainable consumption.

5.4 Conclusion

This research examined the effects of the default option nudge and the descriptive norm nudge on food choice and attitude towards meat consumption in a digital shopping environment. Additionally, the interaction effect between these nudges is tested as well as the

moderating effect of meal type. A digital shopping environment was created, which was subjected to an eye-tracking usability test prior to the main research. Furthermore, two pre-tests using the Q-methodology technique (Stephenson, 1953) were conducted in order to find a dinner and lunch recipe that are likely to be eaten either with meat as without meat. For the main research, an experiment in the digital shopping environment was conducted, followed by a questionnaire. A total of 404 responses were collected and after data cleaning, 232 valid responses were subjected to statistical analyses.

The results show that the default option nudge affected food choice significantly; when a vegetarian default option was presented, more vegetarian purchases were made compared to when a meat default option was presented. One of the most notable findings of this research is that this result was even greater when a vegetarian default option was presented in combination with a vegetarian descriptive norm, indicating an interaction effect between the nudges. However, the descriptive norm nudge on its own had no significant effects. This could be attributed to the fact that respondents moved out of the selection environment before performing the actual behaviour of choosing the food products, while Kallgren et al. (2000) state that the ability of norms to affect behaviour is tied to the norm being deliberately present during the actual behaviour. Finally, results show that meal type significantly moderated the effects of the default option nudge on food choice; when a vegetarian lunch recipe was presented, more vegetarian purchases were made compared to when a vegetarian dinner recipe was presented. Neither of the interventions affected attitude towards meat consumption; all results were insignificant. This could be attributed to the fact that nudges could have different effects on behaviour than on beliefs (Ambuehl et al., 2014; Sunstein, 2016; Cadario & Chandon, 2020).

All in all, these findings indicate that the default option nudge can effectively nudge consumers towards more sustainable consumption, and that this effect can be enhanced by combining the default option nudge with a descriptive norm. Additionally, it can be concluded that the default option nudge has a stronger effect on lunch recipes compared to dinner recipes. Policy makers and recipe providers may benefit from these findings when further aiding the promotion of sustainable consumption. Ultimately, such implications could contribute to decreasing meat consumption globally, which would contribute to decreasing GHG emission in the livestock sector.

Acknowledgement

This Master Thesis is the final proof of competence I need to succeed before graduation. This challenge enabled me to develop a deeper understanding of nudging in general and of conducting academic research. Succeeding this final challenge could not have been accomplished without the help of my two supervisors, whom I wish to thank.

First and foremost, I wish to thank dr. Joris van Hoof, for his guidance and support during the entire process from the research proposal on. Second, I wish to thank dr. Ardion Beldad for his guidance and support as a second supervisor. Without your feedback and efforts, this project would not have been realized.

I would also like to thank my family and friends who kept me motivated to continue working on the project and to put in my best effort. Additionally, I wish to thank my fellow students Mark Rademaker and Mendel Koornstra, who wrote their Master Thesis during the same period, for their advice and guidance in times I required it. A final thanks goes out to all participants in the experiment, the usability test and pre-tests. Without their cooperation this research would not have been accomplished.

Jop Raanhuis,

Hengelo, May 2021

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Appendix A: Pre-test recipes

Dinner (40 recipes):

1. Risottorijst met parmezaan en kip 1. Risottorijst met parmezaan en champignons
2. Risottorijst met parmezaan en kip 2. Risottorijst met parmezaan en vegetarische kip
3. Tomatenrisotto met gegrilde tomaatjes, basilicum en chorizo
3. Tomatenrisotto met gegrilde tomaatjes, basilicum en amandelen
4. Tomatenrisotto met gegrilde tomaatjes, basilicum en chorizo
4. Tomatenrisotto met gegrilde tomaatjes, basilicum en vegetarische chorizo
5. Lasagne bolognese met gehakt 5. Lasagne bolognese met kidneybonen
6. Lasagne bolognese met gehakt 6. Lasagne bolognese met vegetarisch gehakt
7. Indiase tandoori met kip 7. Indiase tandoori met bloemkool
8. Indiase tandoori met kip 8. Indiase tandoori met vegetarische kip
9. Nacho ovenschotel met creme fraise, salsa, quacemole en gehakt
9. Nacho ovenschotel met creme fraise, salsa guacemole en mais
10. Nacho ovenschotel met creme fraise, salsa, quacemole en gehakt
10. Nacho ovenschotel met creme fraise, salsa, quacemole en vegetarisch gehakt
11. Mexicaanse enchiladas met tomaat, paprika en kip
11. Mexicaanse enchiladas met tomaat, paprika en mais
12. Mexicaanse enchiladas met tomaat, paprika en kip
12. Mexicaanse enchiladas met tomaat, paprika en vegetarische kip
13. Chili con carne (met gehakt) 13. Chili sin carne (zonder gehakt, met extra groenten)
14. Chili con carne (met gehakt) 14. Chili con carne (met vegetarisch gehakt)
15. Mexicaanse wraps met tomaat, paprika en kip
15. Mexicaanse wraps met tomaat, paprika en avocado
16. Mexicaanse wraps met tomaat, paprika en kip
16. Mexicaanse wraps met tomaat, paprika en vegetarische kip
17. Quinoa ovenschotel met paprika, courgette en kip
17. Quinoa ovenschotel met paprika, courgette en cashewnoten
18. Quinoa ovenschotel met paprika, courgette en kip
18. Quinoa ovenschotel met paprika, courgette en vegetarische kip
19. Italiaanse cannelloni (pasta) met ricotta en gehakt
19. Italiaanse cannelloni (pasta) met ricotta en spinazie
20. Italiaanse cannelloni (pasta) met ricotta en gehakt

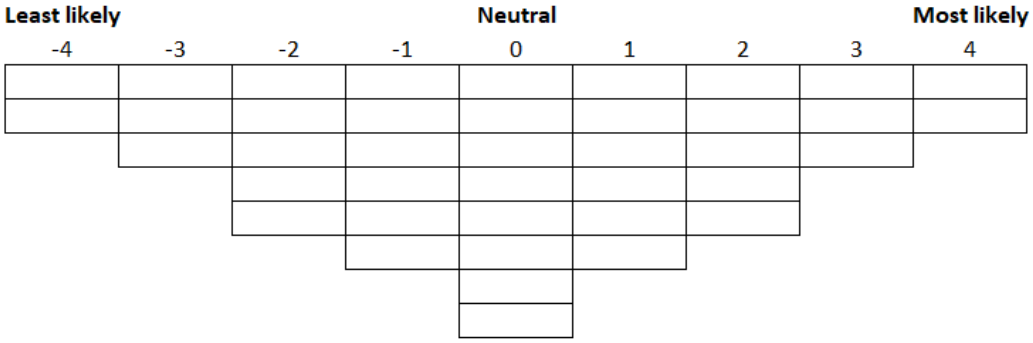
20. Italiaanse cannelloni (pasta) met ricotta en vegetarisch gehakt
21. Indiase curry met kip 21. Indiase curry met zoete aardappel
22. Indiase curry met kip 22. Indiase curry met vegetarische kip
23. Mexicaanse taco’s met kip 23. Mexicaanse taco’s met groente
24. Mexicaanse taco’s met kip 24. Mexicaanse taco’s met vegetarische kip
25. Surinaamse roti met kip 25. Surinaamse roti met zoete aardappel
26. Surinaamse roti met kip 26. Surinaamse roti met vegetarische kip
27. Marokkaanse couscous met kip 27. Marokkaanse couscous met aubergine
28. Marokkaanse couscous met kip 28. Marokkaanse couscous met vegetarische kip
29. Spaanse paella met kip 29. Spaanse paella met paprika
30. Spaanse paella met kip 30. Spaanse paella met vegetarische kip
31. Spaghetti met tomatensaus, mozzarella en gehakt
31. Spaghetti met tomatensaus, mozzarella en paprika
32. Spaghetti met tomatensaus, mozzarella en gehakt
32. Spaghetti met tomatensaus, mozzarella en vegetarisch gehakt
33. Stamppot boerenkool met rookworst 33. Stamppot boerenkool met aardappelen
34. Stamppot boerenkool met rookworst 34. Stamppot boerenkool met vegetarische rookworst
35. Quiche met spekjes 35. Quiche met broccoli
36. Quiche met spekjes 36. Quiche met vegetarische spekjes
37. Broodje hamburger 37. Broodje groenteburger
38. Broodje hamburger 38. Broodje vegetarische hamburger
39. Oosterse roerbaknoodles met kip 39. Oosterse roerbaknoodles met broccoli
40. Oosterse roerbaknoodles met kip 40. Oosterse roerbaknoodles met vegetarische kip

Lunch (20 recipes):

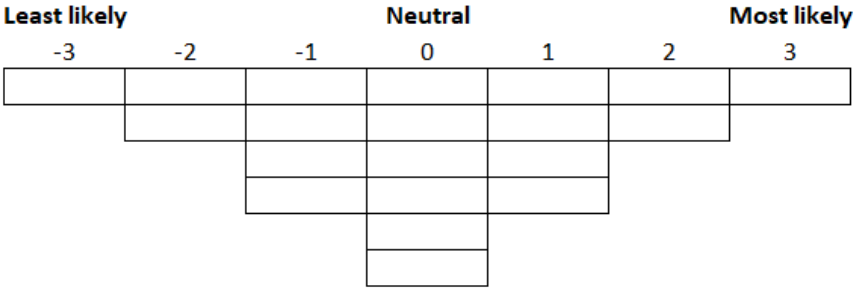
1. Panini met mozzarella, pesto en kip 2. Panini met mozzarella, pesto en tomaat
2. Panini met mozzarella, tomaat, avocado en kip
2. Panini met mozzarella, tomaat, avocado en champignons
3. Wrap met gesmolten kaas, mais, kidneybonen en kip
3. Wrap met gesmolten kaas, mais, kidneybonen en paprika
4. Panini met rucola, pijnboompitjes en parmaham
4. Panini met rucola, pijnboompitjes en kaas
5. Wrap met roomkaas, bieslook en zalm 5. Wrap met roomkaas, bieslook en gegrilde paprika
6. Panini met mozzarella, pesto en kip 6. Panini met mozzarella, pesto en vegetarische kip
7. Panini met mozzarella, tomaat, avocado en kip
7. Panini met mozzarella, tomaat, avocado, en vegetarische kip
8. Wrap met gesmolten kaas, mais, kidneybonen en kip
8. Wrap met gesmolten kaas, mais, kidneybonen en vegetarische kip
9. Broodje met mosterd en rookworst 9. Broodje met mosterd en vegetarische rookworst
10. Stokbrood met smeerworst 10. Stokbrood met vegetarische smeerworst
11. Wraps met spinazie, kaas en chorizo 11. Wraps met spinazie, kaas en ei
12. Omelet met tomaat, paprika en bacon 12. Omelet met tomaat, paprika en prei
13. Gehaktbrood 13. Bananenbrood
14. Stokbrood met kipkerrie salade 14. Stokbrood met komkommersalade
15. Tomatensoep met gehaktballetjes en toast 15. Tomatensoep met paprika en toast
16. Getoast brood met spekjes, brie, walnoten en honing
16. Getoast brood met vegetarische spekjes, brie, walnoten en honing
17. Tosti met kaas en kipfilet 17. Tosti met kaas en vegetarische kipfilet
18. Broodje kroket 18. Broodje vegetarische kroket
19. Saucijzenbroodje 19. Vegetarisch saucijzenbroodje
20. Tomatensoep met gehaktballetjes en toast
20. Tomatensoep met vegetarische gehaktballetjes en toast

Appendix B: Q-sort grids

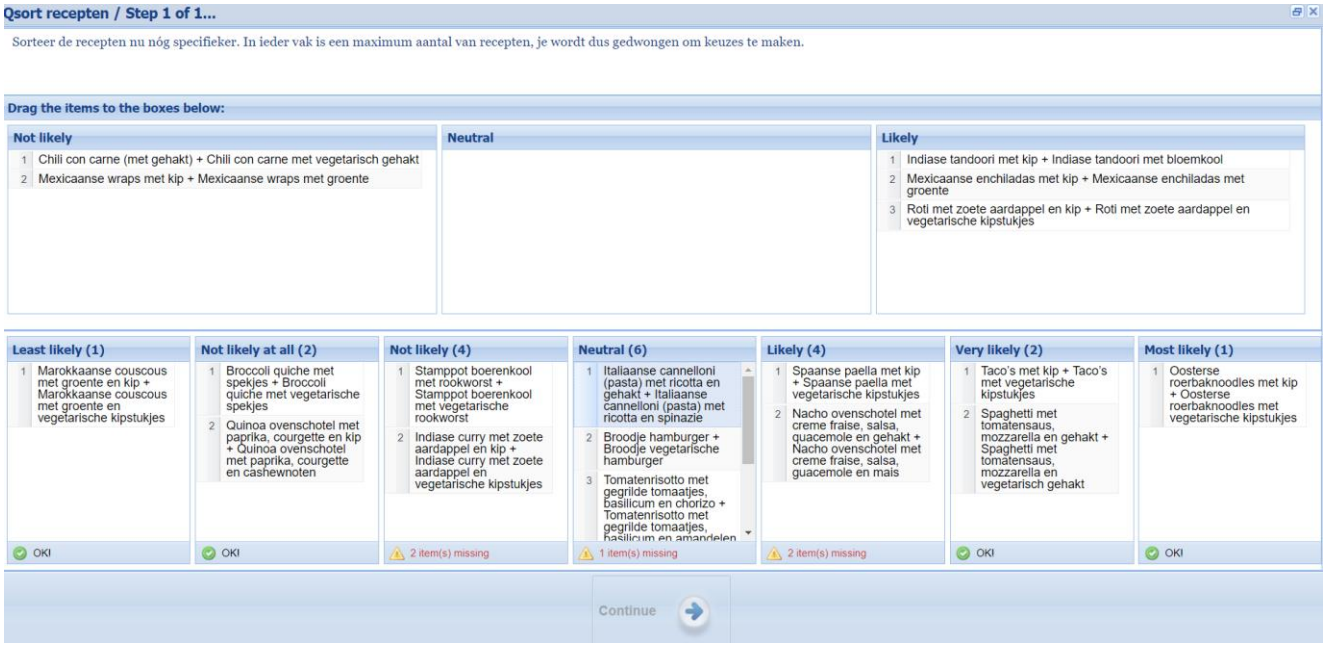
Dinner grid



Lunch grid



Appendix C: Q-sort overview



Appendix D: Q-sort results

Dinner:

		Statements																			
Age	Male/Female	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
24	1	3	1	0	1	0	-1	-2	2	-2	3	-2	0	-2	-3	0	0	-2	-1	2	1
55	2	2	-1	4	3	1	-2	0	-2	4	1	1	-1	0	-2	2	0	-3	-4	1	-1
25	1	1	0	-2	-3	-3	4	4	-2	1	-3	0	-2	-2	-1	0	-1	0	2	2	1
26	1	0	-1	1	0	0	-1	2	0	3	0	1	1	2	-4	-1	-2	-2	-1	0	1
23	1	1	-2	0	-3	1	-3	3	-4	4	0	3	-2	0	-4	4	0	2	-2	0	-2
22	2	4	0	-1	-2	-3	3	3	2	1	0	2	1	-4	-4	1	0	-1	0	0	-1
24	1	-2	-4	0	-3	3	0	3	-1	3	2	2	-2	0	-3	2	-2	-4	1	1	-3
23	2	4	2	-3	-3	3	3	4	3	-1	-1	0	2	0	-1	-1	1	-4	-4	2	1
24	1	-1	2	-3	0	-2	1	-4	2	3	1	1	1	0	-3	4	3	-1	-1	0	-1
24	1	-4	0	-2	-2	0	1	0	0	1	1	1	0	3	0	4	-3	3	-1	-2	2
24	1	-1	-2	-2	1	-3	1	3	-1	3	1	2	0	4	0	3	0	-2	0	0	-3
20	1	-1	-1	1	-2	1	4	3	2	0	-1	3	-2	4	3	0	-2	-4	-4	0	-1
21	1	3	1	1	2	2	4	-1	3	0	0	-2	0	-2	0	-3	0	-3	-1	4	2
19	2	1	-1	4	-1	1	-1	1	-1	4	0	0	-1	1	-4	3	-2	0	-3	1	-2
25	1	-4	-4	-3	0	1	1	-3	-1	4	1	3	2	0	-1	4	2	-1	-1	0	0
25,26667	Total	6	-10	-5	-12	2	14	16	2	28	5	15	-3	4	-27	22	-6	-22	-20	11	-6

Statements																				
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
3	-3	0	-1	1	0	0	-3	2	-1	4	2	1	1	-4	-4	4	-1	-1	2
0	-2	2	0	-1	-2	-4	-3	3	1	1	0	-1	-3	3	0	2	0	2	-1
0	2	3	3	-1	-2	-1	0	-4	-4	0	0	1	3	2	-1	-1	2	1	1
-2	-2	2	-3	0	-3	1	-1	2	-4	3	-3	4	1	2	-1	3	-2	4	0
2	-1	3	-1	1	-2	1	-1	1	-1	2	0	1	0	2	-1	0	-3	2	-1
4	1	2	0	-2	-3	-3	-1	2	1	1	2	-2	0	-1	-2	-1	-2	3	0
2	-2	1	-1	2	-2	1	0	-1	0	1	0	4	-1	-1	0	4	0	1	-1
0	0	2	1	1	1	0	-1	0	-3	-2	1	-1	2	-2	-2	-2	-2	0	0
3	4	0	2	1	2	-2	-1	0	0	-2	0	-2	1	-4	-1	0	2	-3	-2
4	-1	2	-1	1	-3	-1	-1	2	-2	1	-1	-4	-3	2	3	2	0	0	-2
2	-2	2	0	1	-1	-3	-1	-4	-4	2	-1	2	0	1	1	-2	4	0	-1
2	1	2	-1	1	-1	-3	-3	2	1	0	0	2	-2	0	1	-2	-3	0	0
2	1	-2	0	1	0	0	1	-3	-1	1	3	-4	-1	-2	-1	-1	2	-4	-2
3	-1	3	-2	1	-2	0	-3	0	-4	2	0	2	0	2	-2	2	0	2	-3
0	0	2	1	0	-1	0	-1	2	-2	3	1	2	-3	-2	-2	3	1	-2	-2
25	-5	24	-3	7	-19	-14	-19	4	-23	17	4	5	-5	-2	-12	11	-2	5	-12
1,666667	-0,33333	1,6	-0,2	0,466667	-1,26667	-0,93333	-1,26667	0,266667	-1,53333	1,133333	0,266667	0,333333	-0,33333	-0,13333	-0,8	0,733333	-0,13333	0,333333	-0,8
1,718249	1,877181	1,352247	1,521278	1,060099	1,486447	1,667619	1,222799	2,313521	1,9223	1,684665	1,437591	2,554175	1,838737	2,325838	1,656157	2,218966	2,065591	2,193063	1,320173

Lunch:

		Statements																			
Age	Male/Female	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	2	1	-1	0	0	-2	2	3	1	-2	-3	-1	-1	0	0	0	0	-1	2	1	1
25	1	3	1	-1	0	1	2	0	0	-3	-2	-1	1	-1	0	0	2	1	-2	-1	0
56	2	1	2	-3	3	1	-1	0	-2	-2	0	1	0	0	1	2	0	-1	-1	-1	0
24	1	3	2	1	0	1	-1	-1	-1	0	-1	-3	-2	0	0	2	0	-2	1	0	1
25	1	3	1	-1	0	-3	2	0	-1	2	-2	0	0	0	1	1	-2	0	-1	-1	1
26	1	3	0	-1	2	-1	1	1	-3	1	0	0	0	0	-2	-2	0	-1	2	1	-1
25	1	2	-3	2	1	1	1	-1	0	-2	-1	-2	0	1	-1	0	3	-1	0	0	0
23	1	2	1	1	0	0	1	0	0	-2	-1	-1	3	2	0	-1	1	0	-2	-1	-3
22	2	3	1	-1	-3	0	1	0	-1	-2	0	0	-1	-2	0	2	-1	1	2	0	1
24	1	3	0	2	0	-2	0	1	1	0	-2	-1	2	1	0	0	-3	-1	-1	1	-1
27,1	Total	24	4	-1	3	-4	8	3	-6	-10	-12	-8	2	1	-1	4	0	-5	0	-1	-1
	Mean	2,4	0,4	-0,1	0,3	-0,4	0,8	0,3	-0,6	-1	-1,2	-0,8	0,2	0,1	-0,1	0,4	0	-0,5	0	-0,1	-0,1
10,26807	St. Dev.	0,843274	1,505545	1,595131	1,567021	1,505545	1,135292	1,159502	1,264911	1,632993	1,032796	1,135292	1,47573	1,100505	0,875595	1,349897	1,763834	0,971825	1,632993	0,875595	1,286684

Appendix E: Stimulus materials

Scenario 1: Default = Meat; Norms = Present; Meal type = Dinner

Recept: Mexicaanse taco's met kip

Dit recept kan ook zonder vlees! Klik hier voor het recept met groente!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

12 Taco's
Kipfilet (400 gram)
2 Rode uien
Zakje ijsbergsla
Geraspte belegen kaas
Salsasaus mild
Zakje tacokruiden
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Snijd de kipfilet in blokjes en bak deze mooi goudbruin in olie.
3. Snijd de rode uien.
4. Voeg de rode ui en de tacokruiden toe aan de pan en meng het met de kip.
5. Verwarm de tacoschelpen in een ovenschaal zo´n 5 minuten in het midden van een voorverwarmde oven.
6. Besmeer de taco's met salsasaus.
7. Verdeel de kip, rode ui, ijsbergsla en de kaas over de taco's.
8. Verwarm de taco's nog zo'n 3 minuten in de oven tot de kaas gesmolten is.

Scenario 2: Default = Vegetarian; Norms = Present; Meal type = Dinner

Recept: Mexicaanse taco's met groente

Dit recept kan ook met vlees! Klik hier voor het recept met kip!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

12 Taco's
400 gram Mexicaanse roerbakgroente
2 Rode uien
Zakje ijsbergsla
Geraspte belegen kaas
Salsasaus mild
Zakje tacokruiden
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Roerbak de Mexicaanse roerbakmix in de pan.
3. Snijd de rode uien.
4. Voeg de rode ui en de tacokruiden toe aan de pan en meng het met de groente.
5. Verwarm de tacoschelpen in een ovenschaal zo´n 5 minuten in het midden van een voorverwarmde oven.
6. Besmeer de taco's met salsasaus.
7. Verdeel de groenten, rode ui, ijsbergsla en de kaas over de taco's.
8. Verwarm de taco's nog zo'n 3 minuten in de oven tot de kaas gesmolten is.

Scenario 3: Default = Meat; Norms = Absent; Meal type = Dinner

Recept: Mexicaanse taco's met kip

Dit recept kan ook zonder vlees! Klik hier voor het recept met groente!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

12 Taco's
Kipfilet (400 gram)
2 Rode uien
Zakje ijsbergsla
Geraspte belegen kaas
Salsasaus mild
Zakje tacokruiden
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Snijd de kipfilet in blokjes en bak deze mooi goudbruin in olie.
3. Snijd de rode uien.
4. Voeg de rode ui en de tacokruiden toe aan de pan en meng het met de kip.
5. Verwarm de tacoschelpen in een ovenschaal zo´n 5 minuten in het midden van een voorverwarmde oven.
6. Besmeer de taco's met salsasaus.
7. Verdeel de kip, rode ui, ijsbergsla en de kaas over de taco's.
8. Verwarm de taco's nog zo'n 3 minuten in de oven tot de kaas gesmolten is.

Scenario 4: Default = Vegetarian; Norms = Absent; Meal type = Dinner

Recept: Mexicaanse taco's met groente

Dit recept kan ook met vlees! Klik hier voor het recept met kip!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

12 Taco's
400 gram Mexicaanse roerbakgroente
2 Rode uien
Zakje ijsbergsla
Geraspte belegen kaas
Salsasaus mild
Zakje tacokruiden
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Roerbak de Mexicaanse roerbakmix in de pan.
3. Snijd de rode uien.
4. Voeg de rode ui en de tacokruiden toe aan de pan en meng het met de groente.
5. Verwarm de tacoschelpen in een ovenschaal zo´n 5 minuten in het midden van een voorverwarmde oven.
6. Besmeer de taco's met salsasaus.
7. Verdeel de groenten, rode ui, ijsbergsla en de kaas over de taco's.
8. Verwarm de taco's nog zo'n 3 minuten in de oven tot de kaas gesmolten is.

Scenario 5: Default = Meat; Norms = Present; Meal type = Lunch

Recept: Panini met mozzarella, pesto en kip

Dit recept kan ook zonder vlees! Klik hier voor het recept met tomaat!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

2 Panini's
Kipfilet (400 gram)
2 Bolletjes mozzarella
Pesto
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Snijd de kipfilet in blokjes en bak deze mooi goudbruin in olie.
3. Snijd de mozzarella in plakjes.
4. Verwarm de panini's zo'n 5 minuten in het midden van een voorverwarmde oven.
5. Halveer de panini's en besmeer ze aan beide zijden met pesto.
6. Verdeel de kip en de plakjes mozzarella over de panini's.
7. Verwarm de panini´s nog zo´n 3 minuten in de oven tot de mozzarella is gesmolten.

Scenario 6: Default = Vegetarian; Norms = Present; Meal type = Lunch

Recept: Panini met mozzarella, pesto en tomaat

Dit recept kan ook met vlees! Klik hier voor het recept met kip!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

2 Panini's
4 Trostomaten
2 Bolletjes mozzarella
Pesto
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Snijd de trostomaten in blokjes.
3. Snijd de mozzarella in plakjes.
4. Verwarm de panini's zo'n 5 minuten in het midden van een voorverwarmde oven.
5. Halveer de panini's en besmeer ze aan beide zijden met pesto.
6. Verdeel de tomaat en de plakjes mozzarella over de panini's.
7. Verwarm de panini´s nog zo´n 3 minuten in de oven tot de mozzarella is gesmolten.

Scenario 7: Default = Meat; Norms = Absent; Meal type = Lunch

Recept: Panini met mozzarella, pesto en kip

Dit recept kan ook zonder vlees! Klik hier voor het recept met tomaat!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

2 Panini's
Kipfilet (400 gram)
2 Bolletjes mozzarella
Pesto
Olijfolie

Bereidingswijze:

1. Verwarm de oven voor op 200 graden.
2. Snijd de kipfilet in blokjes en bak deze mooi goudbruin in olie.
3. Snijd de mozzarella in plakjes.
4. Verwarm de panini's zo'n 5 minuten in het midden van een voorverwarmde oven.
5. Halveer de panini's en besmeer ze aan beide zijden met pesto.
6. Verdeel de kip en de plakjes mozzarella over de panini's.
7. Verwarm de panini´s nog zo´n 3 minuten in de oven tot de mozzarella is gesmolten.

Scenario 8: Default = Vegetarian; Norms = Absent; Meal type = Lunch

Recept: Panini met mozzarella, pesto en tomaat

Dit recept kan ook met vlees! Klik hier voor het recept met kip!

Door op '**volgende**' te klikken, opent zich de online supermarkt in een nieuw tabblad. U kunt dit tabblad open laten staan om te gebruiken als boodschappenlijstje.

Volgende

Ingrediënten:

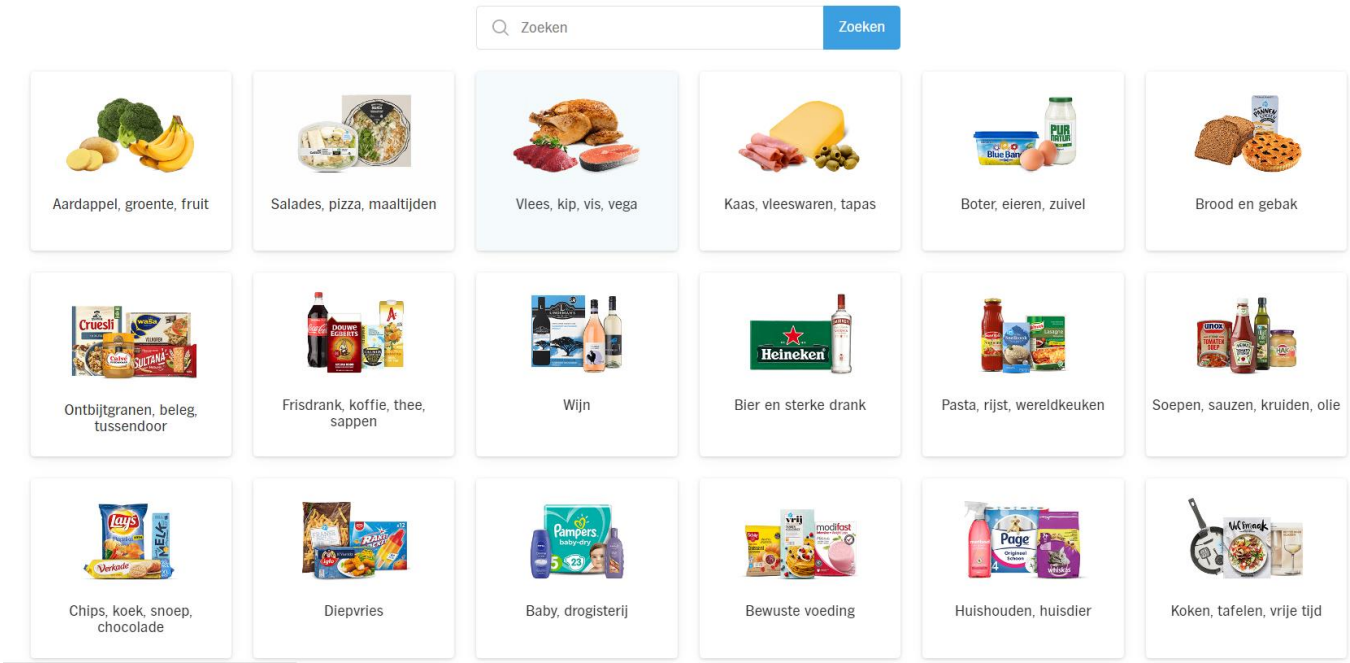
2 Panini's
4 Trostomaten
2 Bolletjes mozzarella
Pesto
Olijfolie

Bereidingswijze:

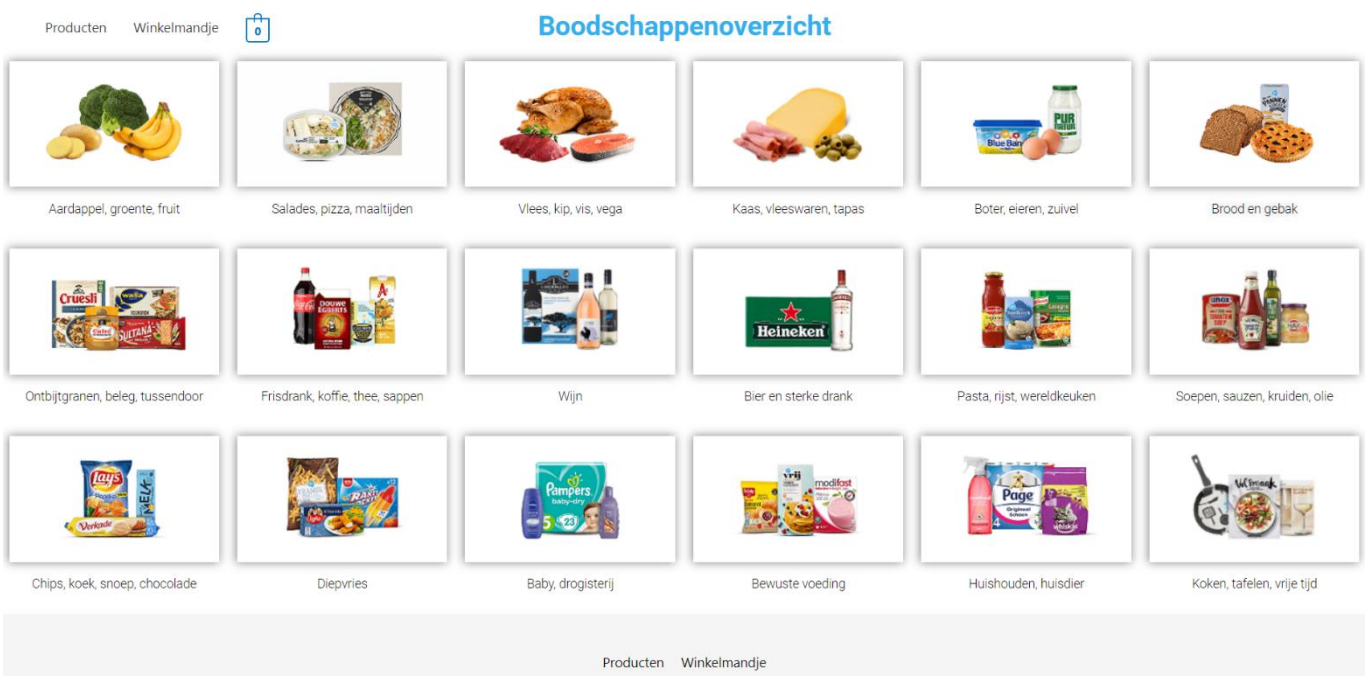
1. Verwarm de oven voor op 200 graden.
2. Snijd de trostomaten in blokjes.
3. Snijd de mozzarella in plakjes.
4. Verwarm de panini's zo'n 5 minuten in het midden van een voorverwarmde oven.
5. Halveer de panini's en besmeer ze aan beide zijden met pesto.
6. Verdeel de tomaat en de plakjes mozzarella over de panini's.
7. Verwarm de panini´s nog zo´n 3 minuten in de oven tot de mozzarella is gesmolten.

Appendix F: Website

Main page benchmark (Albert Heijn, 2020)

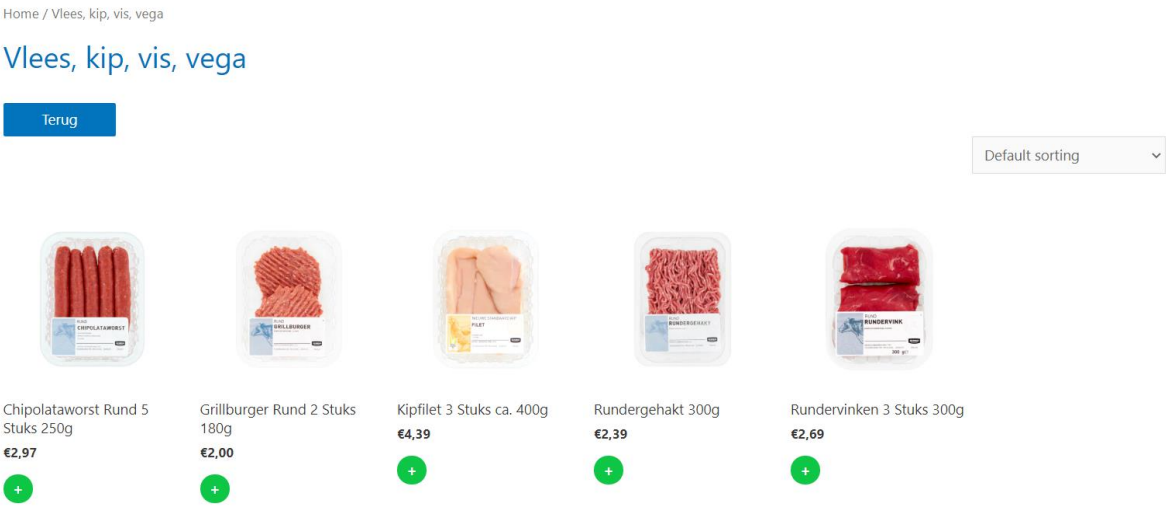


Main page experimental website

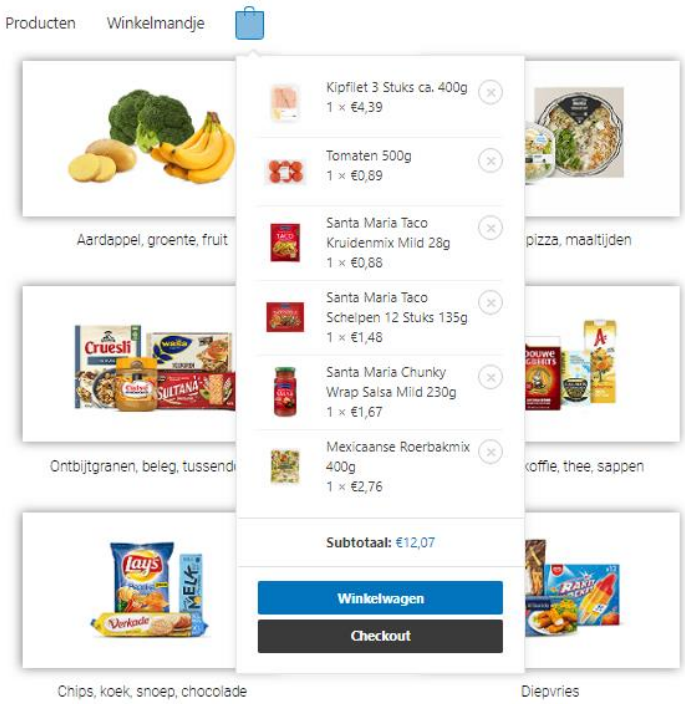


Single product page

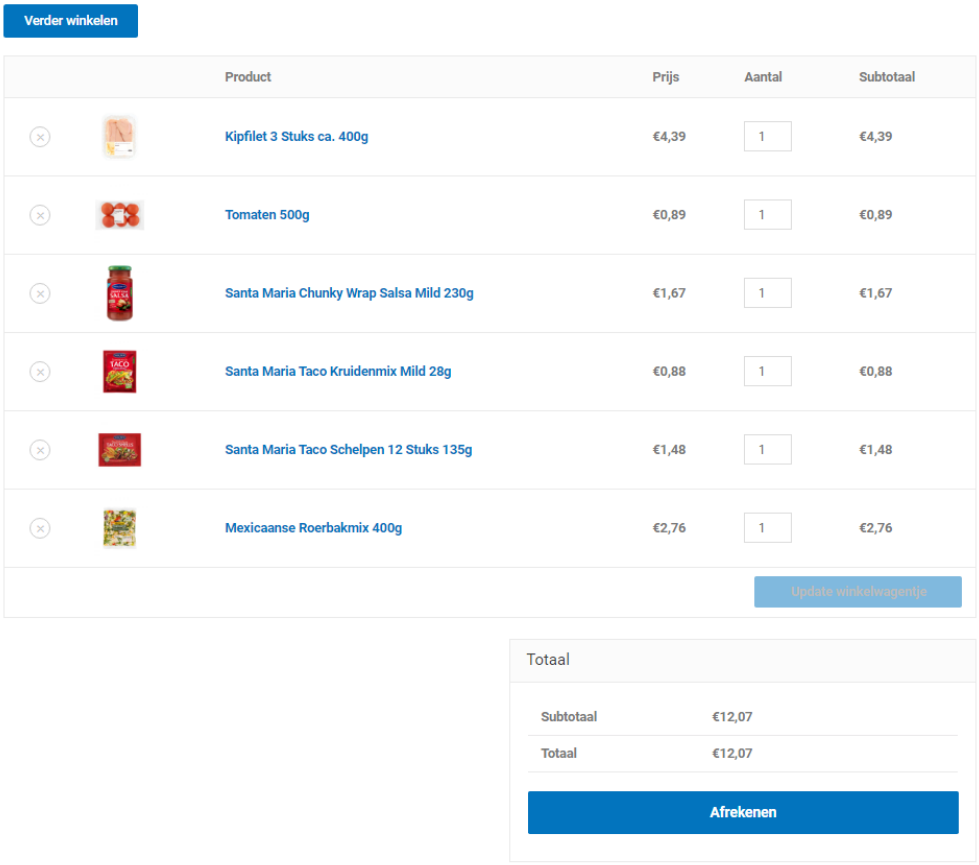
Product category page



Shopping cart widget



Shopping cart page



Appendix G: Information sheet & informed consent

Informatieblad voor onderzoek online nudging Master Thesis

Dit onderzoek wordt geleid door Jop Raanhuis.

Procedure

U neemt deel aan een onderzoek waarbij we informatie zullen vergaren door:

- U een enquête voor te leggen welke u online kunt invullen.
- U een experiment uit te laten voeren op de website van een fictieve online supermarkt.

OF

- U een eye-tracking experiment uit te laten voeren op de website van een fictieve online supermarkt.

Uitsluitend ten behoeve van het onderzoek zullen de verzamelde onderzoeksgegevens worden gedeeld met de Universiteit Twente

Potentiële risico's en ongemakken

- Er zijn geen fysieke, juridische of economische risico's verbonden aan uw deelname aan deze studie. U hoeft geen vragen te beantwoorden die u niet wilt beantwoorden. Uw deelname is vrijwillig en u kunt uw deelname op elk gewenst moment stoppen.
-

Vergoeding

Er wordt een Bol.com voucher t.w.v. 20 euro verloot onder alle deelnemers.

Vertrouwelijkheid van gegevens

Er wordt alles aan gedaan om uw privacy zo goed mogelijk te beschermen. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht, waardoor iemand u zal kunnen herkennen. Voordat onze onderzoeksgegevens naar buiten gebracht worden, worden uw gegevens zoveel mogelijk geanonimiseerd, tenzij u in ons toestemmingsformulier expliciet toestemming heeft gegeven voor het vermelden van uw naam, bijvoorbeeld bij een quote.

In een publicatie zullen anonieme gegevens of pseudoniemen worden gebruikt. De audio-opnamen, formulieren en andere documenten die in het kader van deze studie worden gemaakt of verzameld, worden opgeslagen op een beveiligde locatie bij de Universiteit Twente en op de beveiligde (versleutelde) gegevensdragers van de onderzoekers.

Indien u deelneemt aan het eye-tracking experiment worden de opnames daarvan anoniem gecodeerd en vervolgens verwijderd. De gecodeerde data zal bewaard blijven voor verdere analyse en verbetering van de website.

De onderzoeksgegevens worden bewaard voor een periode van 10 jaar. Uiterlijk na het verstrijken van deze termijn zullen de gegevens worden verwijderd of worden geanonimiseerd zodat ze niet meer te herleiden zijn tot een persoon.
De onderzoeksgegevens worden indien nodig (bijvoorbeeld voor een controle op wetenschappelijke integriteit) en alleen in anonieme vorm ter beschikking gesteld aan personen buiten de onderzoeksgroep.

Tot slot is dit onderzoek beoordeeld en goedgekeurd door de ethische commissie van de faculteit BMS.

Vrijwilligheid
Deelname aan dit onderzoek is geheel vrijwillig. U kunt als deelnemer uw medewerking aan het onderzoek te allen tijde stoppen, of weigeren dat uw gegevens voor het onderzoek mogen worden gebruikt, zonder opgaaf van redenen. Het stopzetten van deelname heeft geen nadelige gevolgen voor u of de eventueel reeds ontvangen vergoeding.
Als u tijdens het onderzoek besluit om uw medewerking te staken, zullen de gegevens die u reeds hebt verstrekt tot het moment van intrekking van de toestemming in het onderzoek gebruikt worden.
Wilt u stoppen met het onderzoek, of heeft u vragen en/of klachten? Neem dan contact op met de onderzoeksleider.

Contactgegevens

Er zijn geen fysieke, wettelijke of economische risico's verbonden aan de deelname van deze usability test. Je bent niet verplicht om vragen te beantwoorden. Je deelname aan dit onderzoek is vrijwillig en je kunt op ieder moment stoppen. Dit onderzoek is beoordeeld en goedgekeurd door de ethische commissie van de faculteit BMS (Behavioural Management and Social Sciences). Bij klachten of verdere vragen kan contact opgenomen worden met de onderzoeker of met het secretariaat van de ethische commissie BMS. Bij vragen over de privacy van data kan contact opgenomen worden met de data protection officer van de Universiteit Twente.

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Data protection officer - dpo@utwente.nl

Tot slot heeft u het recht een verzoek tot inzage, wijziging, verwijdering of aanpassing van uw gegevens te doen bij de Onderzoeksleider.

Informed consent

Door dit toestemmingsformulier te ondertekenen erken ik het volgende:

1. Ik ben voldoende geïnformeerd over het onderzoek door middel van een separaat informatieblad. Ik heb het informatieblad gelezen en heb daarna de mogelijkheid gehad vragen te kunnen stellen. Deze vragen zijn voldoende beantwoord.
2. Ik neem vrijwillig deel aan dit onderzoek. Er is geen expliciete of impliciete dwang voor mij om aan dit onderzoek deel te nemen. Het is mij duidelijk dat ik deelname aan het onderzoek op elk moment, zonder opgaaf van reden, kan beëindigen. Ik hoef een vraag niet te beantwoorden als ik dat niet wil.

Naast het bovenstaande is het hieronder mogelijk voor verschillende onderdelen van het onderzoek specifiek toestemming te geven. U kunt er per onderdeel voor kiezen wel of geen toestemming te geven. Indien u voor alles toestemming wil geven, is dat mogelijk via de aanvinkbox onderaan de stellingen.

3. Ik geef toestemming om de gegevens die gedurende het onderzoek bij mij worden verzameld te verwerken zoals is opgenomen in het bijgevoegde informatieblad. Deze toestemming ziet dus ook op het verwerken van gegevens betreffende mijn gezondheid/ras/etnische afkomst/politieke opvattingen/religieuze en of levensbeschouwelijke overtuigingen/lidmaatschap van vakbond/seksueel gedrag/seksuele gerichtheid en/of over mijn genetische gegevens/biometrische gegevens.	JA □	NEE □
4*. Ik geef toestemming om tijdens het interview opnames (audio/video) te maken en mijn antwoorden uit te werken in een transcript. *Uitsluitend van toepassing voor respondenten die het eye-tracking experiment uitvoeren.	□	□
5. Ik geef toestemming om mijn antwoorden te gebruiken voor quotes in de onderzoekspublicaties.	□	□
6. Ik geef toestemming om mijn echte naam te vermelden bij de hierboven bedoelde quotes.	□	□
7. Ik geef toestemming om de bij mij verzamelde data te bewaren en te gebruiken voor toekomstig onderzoek en voor onderwijsdoeleinden.	□	□
Ik geef toestemming voor alles dat hierboven beschreven staat.	□	

Gegevens deelnemer

_____ _____

Naam deelnemer Handtekening Datum

_____ _____

Leeftijd Geslacht Opleidingsniveau

Gegevens onderzoeker

Ik hierbij bevestig dat ik de deelnemer het informatieblad en het informed consent formulier heb laten doorlezen en dat ik naar er naar mijn beste vermogen voor heb gezorgd dat de deelnemer begrijpt waar ze vrijwillig mee instemmen.

_____ _____

Naam onderzoeker Handtekening Datum

Task form – Usability test - Jopraanhuis.nl

Go to the starting page: jopraanhuis.nl/shop and complete the following tasks. By clicking on ‘’complete order’’ you finish your task and can continue with the next task. The website is fictional and orders will not really be sent. The website is designed in such a way that real payments do not take place. After every task please return to jopraanhuis.nl/shop.

Task 1: *Go to https://jopraanhuis.nl/scenario-6/ You will be presented with a lunch recipe. You can switch between 2 recipes (with meat/without meat). Choose the one you like the most and purchase the products needed for that recipe*

Task 2: *Purchase the following products: 3x pizza salami/mozzarella/pesto, herbs for taco's, tomatoes, cat food, 2x olive oil, any amount of chicken filet.*

Task 3: *Put mozzarella and courgette into your shopping cart. Proceed to the shopping cart and change the amount of courgettes in your cart to 10. Proceed to checkout.*

Task 4: *Purchase the following products: 2x peanut butter, any alcohol, risotto rice, milk, 2x pesto, and 2 paninis.*

Task 5: *Go to: https://jopraanhuis.nl/scenario-1/ You will be presented with a recipe with meat. Switch to recipe without meat. Read the grocery list and the preparation instructions. Purchase the products needed for that recipe.*

Task 6*: Purchase the cheapest chicken filet in the store.*

Thank you for your participation!

Appendix H: Questionnaire

Informatie experiment

Beste deelnemer/deelneemster,

Mijn naam is Jop Raanhuis. Dit experiment is onderdeel van mijn master thesis onderzoek naar consumentengedrag in een online supermarkt. Deelname aan dit onderzoek duurt ongeveer 5 minuten. U maakt hierbij kans op een bol.com bon ter waarde van 20€! Na het verloten van de bon zal alle persoonlijke informatie worden verwijderd om de privacy te waarborgen. De data die verzameld wordt, wordt uitsluitend voor dit onderzoek gebruikt.

Uw deelname aan dit onderzoek is vrijwillig en u kunt op ieder moment stoppen. Dit onderzoek is beoordeeld en goedgekeurd door de ethische commissie van de faculteit BMS (Behavioural Management and Social Sciences). Bij klachten of vragen kan contact opgenomen worden met de onderzoeker of met het secretariaat van de ethische commissie protection officer van de Universiteit Twente.

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Data protection officer - dpo@utwente.nl

Door op akkoord te klikken, verklaard u voldoende geïnformeerd te zijn en in te stemmen met deelname aan dit onderzoek.

Akkoord □

Filter question

1. How often do you eat meat at dinner on average per week?

0 1 2 3 4 5 6 7

Demographics

What is your gender?

What is your age?

What is your highest achieved level of education?

Scenario information and randomization

Below, a recipe, its preparation method and the ingredients needed for the recipe are presented. Take a good look at the recipe. Please, imagine that you are going to prepare the recipe and that you do not have any groceries at home.

By clicking the blue button with 'continue', an online supermarket environment will open in a new tab. This is a fictional online supermarket and purchases in there are not really billed. Purchase the ingredients you need to prepare the recipe. You can use this page as 'grocery list'.

After checkout, click on the arrow on the bottom right of this page to continue with the questionnaire.

Scenario 1/2/3/4/5/6/7/8

Food choice:

Dichotomous variable:

0 = Vegetarian product in shopping cart

1 = Meat in shopping cart

Back to the questionnaire:

Manipulation check questions:

1. Default option

The recipe I was presented with was …

A vegetarian recipe 1 2 3 4 5 A recipe with meat/chicken

2. Descriptive norm

The recipe I was presented with contained …

No red text balloon 1 2 3 4 5 A red text balloon with information about Dutch eating habits

3. Meal type

The recipe I was presented with was a recipe for …

Lunch 1 2 3 4 5 Dinner

Attitude towards meat consumption (Berndsen & Van der Pligt, 2004)

Please rate your 'attitude towards meat consumption' on a 9-point scale on the following scales (5 = neutral):

Bad 1 2 3 4 5 6 7 8 9 Good

Unpleasant 1 2 3 4 5 6 7 8 9 Pleasant

Against 1 2 3 4 5 6 7 8 9 For

Unfavourable 1 2 3 4 5 6 7 8 9 Favourable

Negative 1 2 3 4 5 6 7 8 9 Positive

Attitude towards the recipe (Aschemann-Witzel & Grunert, 2015)

Please rate your 'attitude towards the recipe' for the recipe you were initially presented with, on the following three items:

-Eating this recipe would be ….. (extremely bad 1 2 3 4 5 6 7 extremely good).

-I would be ….. eating this recipe (strongly against 1 2 3 4 5 6 7 strongly for)

-I would ….. eating this recipe (dislike 1 2 3 4 5 6 7 like)

Likelihood to try the recipe (Sundar & Kayanaraman, 2004)

Please rate your 'likelihood to try the recipe' for the recipe you were initially presented with, on the following four items:

1. How likely are you to buy the ingredients for the recipe initially presented with?

Very unlikely 1 2 3 4 5 6 7 Very likely

2. How likely are you to try the recipe initially presented with?

Very unlikely 1 2 3 4 5 6 7 Very likely

3. How likely are you to cook the recipe initially presented with?

Very unlikely 1 2 3 4 5 6 7 Very likely

4. How likely are you to taste the recipe initially presented with?

Very unlikely 1 2 3 4 5 6 7 Very likely

Social desirability of eating meat (Ding, Grewal & Liechty, 2005).

Please rate your 'social desirability of eating meat' on the following four items:

1. I think it is socially desirable to consume meat.

Totally disagree 1 2 3 4 5 6 7 Totally agree

2. My friends would agree that it is socially desirable to consume meat.

Totally disagree 1 2 3 4 5 6 7 Totally agree

3. My family would agree that it is socially desirable to consume meat.

Totally disagree 1 2 3 4 5 6 7 Totally agree

4. There is a general perception that consuming meat is socially desirable.

Totally disagree 1 2 3 4 5 6 7 Totally agree

Enjoyment of eating meat (Audebert, Deiss & Rousset, 2006)

Please rate your 'enjoyment of eating meat' on the following seven items:

1. I get pleasure from eating meat.

Totally disagree 1 2 3 4 5 6 7 Totally agree

2. I get pleasure from eating meat, even if I am alone.

Totally disagree 1 2 3 4 5 6 7 Totally agree

3. Eating meat is a pleasant experience.

Totally disagree 1 2 3 4 5 6 7 Totally agree

4. I like the smell of meat and I like to eat it too.

Totally disagree 1 2 3 4 5 6 7 Totally agree

5. I like the appearance of meat and I like to eat it too.

Totally disagree 1 2 3 4 5 6 7 Totally agree

6. The smell of meat is very unpleasant.

Totally disagree 1 2 3 4 5 6 7 Totally agree

7. I dislike the appearance of meat.

Totally disagree 1 2 3 4 5 6 7 Totally agree

Appendix I: Descriptive statistics interaction effect descriptive norm * default option

Mean and standard deviation values for interaction effect descriptive norm nudge * default option nudge

		Descriptive norm					
		Absent		**Present**		**Average mean scores**	
		N	***M (SD)***	**N**	***M (SD)***	**N**	***M (SD)***
Default option	Vegetarian	60	0.28 (0.45)	56	0.21 (0.41)	116	0.25 (0.44)
	Meat	50	0.62 (0.49)	66	0.80 (0.40)	116	0.72 (0.45)
	Average of mean scores	110	0.44 (0.50)	122	0.53 (0.50)	232	0.49 (0.50)

Note: *M* - Mean value, *SD* - Standard deviation.

Appendix J: Descriptive statistics interaction effect meal type * default option

Mean and standard deviation values for interaction effect meal type * default option nudge

		Meal type					
		Dinner		**Lunch**		**Average mean scores**	
		N	***M (SD)***	**N**	***M (SD)***	**N**	***M (SD)***
Default option	Vegetarian	56	0.36 (0.48)	60	0.15 (0.36)	116	0.25 (0.44)
	Meat	52	0.69 (0.47)	64	0.75 (0.44)	116	0.72 (0.45)
	Average of mean scores	108	0.52 (0.50)	124	0.46 (0.50)	232	0.49 (0.50)

Note: *M* - Mean value, *SD* - Standard deviation.

Appendix K: Descriptive statistics significant socio-demographics on attitude towards meat consumption

Mean and standard deviation values for significant socio-demographics

		Attitude towards meat consumption	
		N	***M (SD)***
Gender	Male	116	6.42 (1.72)
	Female	116	5.47 (1.60)
Education	Low	98	6.23 (1.78)
	High	134	5.73 (1.66)
Meat per week	1 day	5	3.45 (1.08)
	2 days	14	3.30 (0.72)
	3 days	28	4.95 (1.18)
	4 days	42	5.57 (1.41)
	5 days	58	6.09 (1.59)
	6 days	85	6.94 (1.40)

Note: M - Mean value, *SD* - Standard deviation.