YOU CAN LEAD A HORSE TO WATER, BUT CAN YOU MAKE IT DRINK?

AN EXPERIMENTAL STUDY ON THE IMPACT OF SUPRALIMINAL- AND SUBLIMINAL PRIMING ON ANIMAL FRIENDLY FOOD CHOICE, PURCHASE INTENTION AND ETHICAL OBLIGATION

MASTER THESIS COMMUNICATION STUDIES - DIGITAL MARKETING COMMUNICATION

UNIVERSITY OF TWENTE.

Researcher
Kevin Pegel

MASTER THESIS

YOU CAN LEAD A HORSE TO WATER, BUT CAN YOU MAKE IT DRINK?

An experimental study on the impact of supraliminal- and subliminal priming on animal friendly food choice, purchase intention and ethical obligation

Researcher:	Kevin Pegel
Student number:	S2208458
University:	University of Twente
Faculty:	Faculty of Behavioural, Management and Social Sciences (BMS)
Study:	MSc. Communication Studies
Specialization:	Digital marketing communication

EXAMINATION COMMITTEE

First supervisor:	Dr. J.J. van Hoof
Second supervisor:	Dr. T.J.L. van Rompay

Date:	02/12/2020
Place:	Enschede, The Netherlands

ABSTRACT

AIM. This study investigates to what extent supraliminal- and subliminal priming can positively affect food choice, purchase intention and ethical obligation with regards to animal friendly food products. The aim of this study is to explore whether consumers can be supported in making food choices that positively impact animal welfare.

METHODOLOGY. A 2 (subliminal priming: absent vs. present) x 2 (supraliminal priming: absent vs. present) x 2 (attitude towards animal welfare: negative vs. positive) experimental research was conducted. A potential interaction effect between the two types of priming was studied, as well as a moderating variable in attitudes towards animal welfare. Participants (N = 158) were randomly assigned to one of four conditions, in which the manipulation contained either both types of priming, one type of priming or no priming. After the manipulation, a questionnaire composed of food choices and questions on purchase intention and ethical obligation regarding animal friendly food products was completed.

RESULTS. Analysis of results showed a marginal moderation effect (p = .08) of attitudes towards animal welfare on supraliminal priming effects. Accordingly, a significant moderation effect of attitudes on supraliminal priming effects on ethical obligation was found (p = .016). These findings show that supraliminal priming effects are stronger for people with positive attitudes towards animal welfare. More specifically, supraliminal priming significantly increased feelings of ethical obligation with regards to purchasing animal friendly food products for people with positive attitudes. Interestingly, supraliminal priming caused ethical obligation to decrease for people with negative attitudes. Furthermore, analysis of descriptive statistics led to a promising pattern of positive effects of priming on the dependent variables, with the largest effects in the interaction condition.

CONCLUSION. Other than the moderation effect, no significant main effects were found. This is not in line with expectations based on prior research, which showed positive effects of both types of priming on eating and drinking behaviour, product preference, purchase intention and more. Although, the findings of marginal and significant effects of attitudes towards animal welfare on supraliminal priming effects and the pattern of positive effects of priming on the dependent variables seem promising. This study offers various practical and theoretical implications and insights that are valuable for future research. Questions on whether priming through video content could be successfully implemented through changes in the research design were raised. The outcomes of this study could benefit future research, as it offers insights into the opportunities of priming through video content. This study can be seen as another step in the right direction to discover how priming can be used for positive purposes.

KEYWORDS: subliminal priming, supraliminal priming, animal friendly food choice, animal welfare, purchase intention, ethical obligation

TABLE OF CONTENTS

1. INTRODUCTION

1.1 ETHICAL CONSUMERISM

Ethical consumerism is flourishing worldwide, which is expected to continue (Adams, 2010). Concerns such as human rights, animal welfare, health, country of origin, anti-globalization and fair trade are increasingly becoming more important for the average consumer (Auger and Devinney, 2007; Shaw, Shiu & Clarke, 2000). De Ferran and Grunert (2007) describe ethical consumption as people taking societal norms and what is 'good' for society into account when making consumer decisions. As mentioned, animal welfare is one of the concerns which is becoming increasingly important. Animal welfare can be described as beliefs of what is right or wrong in animal care and treatment, that relates to human and social values, moral considerations and ethical concerns (Cembalo, et al., 2016). The United Nations (UN) aim to improve animal welfare with Sustainable Development Goal 12: Responsible consumption and production (United Nations, 2020). Goal 12 describes how the UN wants to ensure sustainable consumption and production patterns. With regards to animal welfare, the UN wants to achieve the sustainable management and efficient use of natural resources by 2030 (United Nations, 2020). One of the targets related to Goal 12 is to ensure that people everywhere around the world have access to information regarding this issue and are aware of how to live their life in harmony with nature. This research aims to support this goal by examining whether supraliminal priming and subliminal priming can aid people in making animal friendly food choices.

1.2 CONSUMPTION AND ANIMAL WELFARE IN THE NETHERLANDS

In the Netherlands, sales of animal friendly food products are increasing rapidly. For example, in 2016, the sales of products with the 'Beter Leven-keurmerk' (Better Life label), increased by 99% (Logatcheva, 2016). The Beter Leven-keurmerk is the most important third-party logo in the Netherlands with regards to animal friendly production of food products, which indicates the living conditions of animals with one, two or three stars. The higher the number of stars on the packaging, the more animal friendly the product has been produced (Beter Leven Dierenbescherming, 2020). Revenues of the Beter Leven-keurmerk have soared in recent years, growing by 25% in 2019.

In the Netherlands, consumers between the age of 12 and 34 years old are most concerned about how their food choices affect animal welfare (Voedingscentrum, 2016). The study of Voedingscentrum (2016) showed that 73% of Dutch consumers between the age of 12 to 18 consider it important that the meat they eat comes from animals that have been treated well (Voedingscentrum, 2016). More than half of 546 respondents stated that they would like to receive information, support and tips on how to improve animal welfare through food choice.

Furthermore, the study of Keuchenius & de Graaf (2017) showed that Dutch people from the age of 18 to 34 are the biggest consumers of animal friendly food products. It was also found that this group is also motivated to consume more of these products than they do currently. Respondents largely stated that they are aware of different aspects of ethical consumerism such as third-party logos, and that it affects their food choices. Respondents also felt that companies selling food products should provide more information and advice regarding animal friendly food choices. These findings reinforce the purpose of this study, which is to support consumers in making decisions that are consistent with their values to improve animal welfare.

1.3 ONLINE INFLUENCES ON FOOD CHOICE

In this day and age, people increasingly consume online content about food. In 2014, Google saw views of food and recipe related content on YouTube grow by 59%, with social engagement rising by 118%. Google stated that in 2017, the watch time of recipe-related videos increased by 250% (Google, 2017). In 2018, there were over four million recipe-related videos on YouTube, with an increase of 110% in interest in cooking "skill" videos (Google, 2018). According to Google, people that are most interested in these videos are millennials (people aged between 18 to 34). They watch food videos with various purposes, such as exploring new foods, being entertained, learning new skills and learning how to prepare meals (Delgado, Johnsmeyer, & Balanovskiy, 2014).

When visiting online web shops of Dutch grocery stores such as Jumbo and Albert Heijn, recipe videos can be found throughout. They offer their visitors the opportunity to explore new recipes, learn how to cook them, know exactly which ingredients they need and then purchase them through this channel. Purchasing food products through online channels is becoming increasingly popular. In a recent study, it was stated that 1.3 million Dutch consumers purchase food from an online grocery shop on a weekly basis (Multiscope, 2020). In 2020, 21% of Dutch consumers purchased products from an online grocery shop, while this was 12% in 2016. Especially people between the age of 18 and 49 purchase food online, with minor differences between the age group of 18 to 34 and 35 to 49. Furthermore, the growth of online grocery shopping is expected to increase because of the recent COVID-19 'Coronavirus' outbreak. According to Westerveld (2020), Jumbo received 50% more online orders since the outbreak and the online supermarket Picnic had to employ at least 700 people due to increasing demands. Whether this will cause long term growth of online grocery shopping remains to be studied.

Within this research, the impact of supraliminal and subliminal priming on food choices, purchase intention and ethical obligation with regards to animal friendly food products will be studied. People between the age of 18 and 34 increasingly watch food-related videos to inspire their own cooking, use online channels to purchase food products and consider animal welfare as important. Thus, studying whether these people can be supported in making choices that positively impact animal welfare seems interesting. As

online channels often offer food-related video content, people could be primed in the same environment in which they purchase their food products. Therefore, this research will focus on to what extent priming through food related video content affects food choice, purchase intention and feelings of ethical obligation of Dutch consumers between the age of 18 and 34.

1.4 A BRIEF DESCRIPTION OF PRIMING

1.4.1 UNCONSCIOUSLY AFFECTING MENTAL PROCESSES

Priming can be used to activate mental representations unobtrusively to unconsciously affect mental processes and subsequent behaviour (Chartrand & Bargh, 2000). When a mental schema is activated, it can influence how new information is interpreted and therefore, it can change behaviour (Bargh, Chen, & Burrows, 1996). In order to activate mental processes and affect behaviour, a prime must trigger thoughts associated with the behaviour. This explains why priming does not affect every person in the same manner. The stimuli used for priming are often presented supraliminally or subliminally.

1.4.2 SUPRALIMINAL AND SUBLIMINAL PRIMING

Priming has been studied extensively, often for market research related purposes. Elgendi et al. (2018) describes visual primes as either supraliminal (primes that people can perceive, but are not aware off) or subliminal (primes that cannot be perceived consciously). Within this study, the effects of supraliminal and subliminal priming on the choice of animal friendly food products will be studied. As people increasingly consume information about food products and preparation of food through online video content, the potential effects of visual priming will be measured.

According to Elgendi et al. (2018), subliminal visual priming occurs when a person is exposed to a stimulus for less than 500 milliseconds (ms), which is the threshold of perception, and is not aware of the stimuli. When a stimulus has a duration greater than 500ms, the prime is supraliminal, which means it can be perceived by the conscious mind. The threshold of perception of 500ms is challenged by various studies. During the 2000 presidential election, an advertisement from the Bush campaign was aired, which showed the word RATS. The word was flashed through the screen quickly (300ms), but it was discovered quickly because people noticed it. A lot of people wondered if this was done on purpose, and whether it affected people. Weinberger & Westen (2008) replicated essential aspects of the ad and conducted two experiments to study the potential effects of the subliminal message and evaluations of politicians. The results showed that the subliminal stimulus affected evaluation of politicians, as showing the word RATS had a negative impact. In most studies, a duration of around 30 to 40ms is used for subliminal primes (Difa, 2016; Cooper & Cooper, 2002; Gorp, 2017; Kam, 2007; Sato et al., 2019) which will be expanded upon in the theoretical framework.

1.4.3 THE SUBLIMINAL MERE EXPOSURE EFFECT

Elgendi et al. (2018) claims that despite not consciously perceiving the stimuli, people can still be influenced by them. This is explained by the *subliminal mere exposure* (SME) effect. The SME effect enhances liking for stimuli by repeatedly exposing a person to subliminal visual primes. The research even shows that the SME effects are significantly stronger than the mere exposure effect of consciously perceived stimuli. Within the experiment of Elgendi et al. (2018) masked pictures were flashed briefly, whereafter 13.5% of the participants were able to name them. When the pictures were shown again 15 minutes later, without any indication of possible repetitions, naming accuracy increased to 34.5%.

1.4.4 PRIMING TO IMPROVE ANIMAL WELFARE

Within this research, the potential effects of supraliminal- and subliminal priming on purchase intention, ethical obligation and choice of animal friendly food products will be studied. This will be done in order to support consumers in making ethical food choices, which the target group of Dutch consumers between 18 and 34 years old is increasingly interested in. Because people are also increasingly watching online video content to inspire their own cooking, participants will be exposed to primes through such content. In order to test the potential effects of priming, an experimental research design will be used. An experiment will be conducted by using a 2 (subliminal priming: absent vs. present) x 2 (supraliminal priming: absent vs. present) x 2 (attitude towards animal welfare: negative vs. positive) experimental research design. Whether combining the two types of priming will strengthen effects will also be measured.

Accordingly, the following research questions were formulated and will be central to this study:

> *To what extent can supraliminal- and/or subliminal priming affect food choice, purchase intention and ethical obligation with regards to animal friendly food products?*
>
> *To what extent do attitudes towards animal welfare affect the strength of priming effects?*

2. THEORETICAL FRAMEWORK

In the following paragraphs, an overview of research on supraliminal- and subliminal priming is given. Furthermore, the impact of feelings of ethical obligation and attitudes towards animal welfare on animal friendly food choice is described. Lastly, laws and regulations surrounding priming are specified and the research model central to this study is presented.

2.1 THE IMPACT OF SUPRALIMINAL PRIMING

Supraliminal primes can be perceived by the conscious mind, but they are used with the aim to influence behaviour unconsciously (Elgendi, et al., 2018). The effects of supraliminal priming on eating behaviour and food choices has been studied widely (Papies et al., 2007; Stroebe et al., 2008; Forwood et al., 2015; Versluis & Papies, 2016; Minas et al., 2016; Ohtomo, 2017). For instance, Minas et al. (2016) conducted a study focusing on the potential effect of supraliminal priming on calorie intake. The treatment groups were exposed to semantic visual primes using healthy body image, goal-oriented words. To measure the potential effects of the primes, consumed kilocalories were counted. The results showed that healthy body image priming led to a reduced calorie intake.

According to Cave (1997), visual priming of 'supraliminal' objects has been found to have a significant and long-lasting effect. In a more recent study, Francken et al. (2011) stated that supraliminal primes have a more significant, stronger and longer-lived effect on behaviour, compared to subliminal primes. As many studies show how eating behaviour and product preference can be significantly affected by supraliminal priming, examining whether it can be used to support consumers in making food choices that positively affect animal welfare seems interesting.

Within the following paragraphs, an overview of current studies relevant to supraliminal is given. Subjects of the mentioned studies include; reducing the amount of consumed food, reducing unhealthy eating habits, increasing preference for healthy foods, affecting eating behaviour and self-regulation and increasing product preference.

REDUCING THE AMOUNT OF CONSUMED FOOD

In 2016, Versluis & Papies conducted a research on whether the 'pack size effect' can be prevented with diet primes. The pack size effect explains how an increase in the package size of food products has been shown to lead to an increase in the amount of food consumed. Two experiments were conducted in which diet-related commercials and a dieting magazine served as diet primes. In the first experiment, Dutch participants between 18 and 55 years old were either exposed to a magazine cover showing 'Get in shape' or 'Time for travel'. The diet-related magazine featured an image of a silhouette of a woman jumping into the arms of a man. Both the man and the woman had a healthy weight. The headlines on the magazine were related to diets, weight loss, fitness and

discipline. The travel magazine featured images of London and headlines related to city trips. After the participants answered questions about the magazine cover, they were presented with four snack eating scenarios. In each scenario the participant had to indicate their expected consumption. For example, a picture of either 30 pieces or 14 pieces of chocolate could be shown, measuring whether package size influences the desired amount of food.

In the second experiment, participants were asked to watch various movie clips. While watching the clips, snacks were available. The clips were either diet commercials that primed a dieting goal including products and services such as Weight Watchers, Dannon Light & Fit yoghurt and Nike Basketball. The neutral commercials included products and services such as FedEx, Amazon Kindle and Philips Ambilight. As expected, the results showed that the diet primes reduced restrained eaters' consumption for large packs. According to Versluis & Papies (2016), these findings suggest that activating dieting goals can support dieters in controlling their intake even when exposed to large quantities of tempting snacks. Unexpectedly, it was found that unrestrained eaters also ate less when primed with the dieting goal. Thus, within this study diet-related primes significantly decreased the amount of food consumed by participants.

In another study, supraliminal priming was used to reduce calorie intake, with gender and eating restraint as moderation factors (Minas et al., 2016). Results showed that the healthy body image related primes led to reduced calorie intake of females, with no effect on males. There was no significant variance between the effects for restrained and unrestrained eaters. More information on this study can be found in Appendix A.

REDUCING UNHEALTHY EATING HABITS

Ohtomo (2017) studied whether priming diet related images can effectively reduce unhealthy eating habits. The primes were used to activate a dieting goal in a situation in which people are tempted to eat unhealthy food, in order to study whether their behaviour would be in line with the primed goal. Participants were asked to view pictures of advertisements and answer related questions. They were exposed to random shots of three pictures on a computer and asked to answer eight semantic differential questions (e.g., favourable-unfavourable, good-bad). In the priming condition, three pictures of famous Japanese slim pop idols were shown, while three pictures of animals were shown in the control condition.

After answering the questions, participants were told they could take as many cake snacks as they wanted for participating in the experiment. The number of cakes taken was measured as dependent variable. To study whether diet intention and snacking habits affect eating behaviour, these constructs were measured through a questionnaire. The results indicated that diet intention did not affect behaviour in any condition. Snacking habits did affect behaviour in the control condition because more snacks were taken, but this effect was not found in the priming condition and the number of snacks taken was

reduced. Therefore, it was concluded that exposing participants to diet primes significantly reduced unhealthy eating habits.

INCREASING PREFERENCE FOR HEALTHY FOODS

Forwood et al. (2015) conducted a study due to an increasing desire from policy makers to guide people toward choosing healthier foods in the context of food purchasing environments filled with advertising and promotions. The research tested whether priming healthy food adverts to increase preference for healthier food could be effective and generalized to a representative population. Two experiments were conducted in which participants completed various tasks, including an advert rating task, a questionnaire about food shopping habits and memorization tasks. During the tasks, participants in the priming conditions were supraliminally primed with adverts about fruits and vegetables. For instance, an advertisement could include a person eating a banana paired with a positive statement (e.g., "Everyone's favourite"). In the control condition, no advertisements were shown.

The findings indicated that highly educated participants chose significantly more fruit when hungry and primed. Less educated participants' food choice was unaffected by primes or hunger. Therefore, the research provides preliminary evidence that the effects of healthy eating primes depend on individual traits and are not generalizable to a broader population. Although it is unknown whether this is also the case for animal friendly food choice, these findings will be taken into account. The results also show how research should be conducted in order to discover how certain groups could be effectively primed to support healthy eating behaviour.

EATING BEHAVIOUR AND SELF-REGULATION

Papies & Hamstra (2010) conducted a study in which the effect of environmental cues on self-regulation was measured. Prior research showed that being confronted with tempting foods can trigger overeating, even more so for restrained eaters. Therefore, the eating behaviour of people in a local butcher shop was measured by exposing them to free meat snacks. The snacks were presented on the counter, with a small sign indicating that they were samples for tasting. Half of the participants were primed with a poster that was attached to the entrance door of the store in such a way that it was clearly visible from the outside when entering the store. The poster showed a recipe of the butcher shop that was low in calories and "good for a slim figure". Eating behaviour was measured by the number of snacks consumed.

In line with earlier studies, the results showed that restrained eaters overate when exposed to food cues (Papies et al., 2007; Stroebe et al., 2008). At the same time, the study showed that when restrained eaters were exposed to the dieting related prime, self-regulation was enhanced and overeating was prevented. Furthermore, the results

showed that men ate more of the snacks than women and the eating behaviour of unrestrained eaters was not affected by the dieting prime.

INCREASING PRODUCT PREFERENCE

According to Fukawa & Niedrich (2015), the effects of supraliminal priming on product preference have been explained by two activation mechanisms, which are trait activation and goal activation. In their research, an additional activation mechanism that is not explained by goals or traits was identified. Using implicit associations as a process measure, this study provides evidence that the effect of supraliminal primes on product preference results from conceptual fluency and the fluency heuristic. This explains that when a person is exposed to primes related to a certain concept (e.g., luxury), preference of products related to this concept (e.g., Rolex watch) would increase.

Respondents were asked to complete tasks in which they had to construct a grammatically correct four-word sentence from a five-word jumble. These jumbles contained semantically related stimuli (e.g., saving, thrifty, bargain) that were used to prime the target concept (e.g., frugal). Afterwards, the participants rated their preference between a luxury product and a frugal product in the same product category. For instance, a respondent could be asked to rate their preference of a Rolex watch (luxury choice) and a Timex watch (frugal choice) on a 9-point scale. The same was done in a second group, but the product preference of wholesome vs. decadent products was measured. The results of the first experiment showed supraliminal priming significantly affected product preference when participants were in a positive mood and the cognitive load was high. The effect was at its strongest when the opportunity and motivation to process information was low. The results of the second experiment replicated the aforementioned effects, suggesting that the effects of supraliminal primes are most likely with low opportunity and motivation to process information (Fukawa & Niedrich, 2015).

Studies reporting significant effects of supraliminal priming on eating behaviour, preference for healthy foods and product preference provide promising insights for the current research (Papies et al., 2007; Stroebe et al., 2008; Papies & Hamstra, 2010; Forwood et al., 2015; Fukawa & Niedrich, 2015; Versluis & Papies, 2016; Ohtomo, 2017). Based on the mentioned studies, it is expected that supraliminal priming of words positively related to animal welfare will increase food choice, purchase intention and feelings of ethical obligation with regards to animal friendly food products. Accordingly, the following hypothesis was formulated:

> *H.1. Presence of supraliminal primes of words positively related to animal welfare increases animal friendly food choice of meat (H1a), dairy (H1b) and vegetarian products (H1c), purchase intention (H1d) and feelings of ethical obligation (H1e) with regards to animal friendly food products, as opposed to when these primes are absent.*

2.2 THE IMPACT OF SUBLIMINAL PRIMING

Subliminal priming is a controversial subject which became popular in 1957, due to the publicity around social psychologist and private market researcher James Vicary (Karremans et al., 2006). Vicary claimed that sales of Coca Cola and popcorn substantially increased after subliminally flashing the messages "Eat popcorn" and "Drink Coca Cola" to 45,699 moviegoers in a New Jersey theatre. The results of the study showed that sales of popcorn increased by 57.5% and Coca-Cola by 18.1%. Later it was determined that the study was fraudulent and Vicary admitted that it was a publicity hoax (Rogers, 1992). The fabricated study of Vicary is one of the most well-known studies on the subject.

Vicary's study aroused interest among many researchers, as a result of which research has been conducted in many fields to measure potential effects. Various studies on subliminal priming show significant effects on consumption of fluids and food, non-conscious goal activation, brand choice, product evaluation and brand evaluation (Cooper & Cooper, 2002; Strahan et al., 2004; Chartrand et al., 2008; Légal et al., 2012; Smarandescu et al., 2015; Varga L. et al., 2016; Difa, 2016). Furthermore, studies of Karremans et al. (2006), Tsai et al. (2007), Veltkamp et al. (2011) and Smarandescu et al. (2015) demonstrate how subliminal priming can influence product and brand choice with regards to fast moving consumer goods (i.e. drinks, snacks). All of the mentioned studies report significant results on the influence of subliminal priming, which will be elaborated upon in the next paragraphs.

AFFECTING MOTIVATIONAL STATES

In 2002, Cooper & Cooper studied whether subliminal priming can affect motivational states by conducting two experiments. In the first experiment, subjects watched an entire episode of *The Simpsons* television program (22 min). Verbal and visual stimuli were embedded in the program, which were related to thirst. The program contained 24 frames which were displayed for 33ms, 12 were pictures of the word "thirsty", and 12 were images of *Coca Cola* cans. The frames were alternated and appeared at scene changes. Respondents stated that they did not notice stimuli embedded in the program, even when they were told so. In the second experiment, participants watched a shortened version of the episode (9 min). Half of this group watched the episode containing 12 subliminal primes, the other half saw the control version.

According to the results, it can be concluded that subliminal stimuli can affect people's motivational states (Cooper & Cooper, 2002). Participants in the first group stated to be considerably thirstier than control participants. The second experiment replicated this finding. The level of thirst before priming was measured to indicate whether priming thirst affected their motivation to drink. The result show that the primes caused participants to believe they were experiencing the sensation of thirst. Yet, only moments before they were hardly thirsty at all. Cooper & Cooper (2002) stated that the complete lack of any

conscious awareness of any link in the process makes the case of subliminal activation of motivational states is a very interesting issue to consider.

INCREASING FLUID CONSUMPTION

Strahan et al. (2002) studied the role that motivation can play in the relation between persuasion and subliminal priming. An experiment was conducted in which participants were asked to taste a variety of products. Before partaking in the experiment, they had to refrain from eating or drinking anything for three hours. Firstly, participants were asked to eat a dry cookie. Afterwards, they either received water to "cleanse their palate" or they did not. Secondly, the participants were asked to complete a computer task, during which they were primed with either thirst-related words or neutral words. 26 subliminal primes were shown with a duration of 16ms each. Thirdly, they were asked to "taste test" two beverages. The results showed that subliminal priming did not affect how much participants drank when they were satiated, but it did when they were thirsty. The thirsty participants drank more when they were primed with thirst-related words.

INCREASING CONSUMPTION OF CALORIES AND MOTIVATION TO QUENCH THIRST

In 2004, Strahan et al. conducted another experiment to determine whether subliminal priming can influence calorie intake of women who chronically restrain their eating. It was studied whether women who were unrestrained eaters respond differently to subliminal primes then women who were restrained eaters. Women that were classified as restrained eaters are extremely focused on their body shape and weight and try to lose weight by restricting their calorie intake. In this experiment, these restraint mechanisms were tested by showing word primes related to overeating and measuring the amount of consumption of a high calorie beverage.

The results showed that when restrained eaters were primed, they consumed just as much of the beverage as unrestrained eaters. Furthermore, participants were also asked how many coupons they wanted for each drink. One drink was called 'Super-Quencher' and the other 'PowerPro'. The thirsty participants who were primed with thirst-related words preferred the Super-Quencher drink. The participants who were primed with neutral words showed no preference. Concluding, subliminal priming significantly increased calorie intake and the motivation of thirsty participants to quench their thirst.

INCREASING FLUID CONSUMPTION WITHOUT DEPRIVATION

Previous research suggests that subliminal priming of behaviour (e.g., drinking water) only motivates consumers outside conscious awareness if primes match a present basic need (e.g., fluid deprivation). Veltkamp et al. (2011) conducted a research testing whether subliminal priming can cause people to perform need-related behaviour in the absence of deprivation. In order to do so, two experiments were conducted. Participants completed a product-comparison task in which they had to eat two different crackers and

then filled out a questionnaire to rate various aspects of the crackers (e.g., shape). Participants that were not deprived received an empty glass and a jug of water and were allowed to drink water before the next task. The other group was not provided with water, making them more deprived.

Participants were then assigned to various tasks such as a "dot-detection task". During these tasks, participants in the priming condition were primed with words related to drinking. These words were either paired with positive (e.g., fun, love) or neutral (e.g., thus, furthermore) words. According to the results, subliminal priming of words related to drinking water paired with positive words made it a desirable behaviour which motivated people to drink water in the absence of deprivation. Concluding, this study shows subliminal priming can motivate consumers as if they were deprived of a need, without the prime depending on actual deprivation.

INCREASING PURCHASE INTENTION OF BRANDED DRINK

Karremans et al. (2006) conducted a study based on the research design of the study of Vicary, which assessed whether subliminal priming of a brand name affects product choice for the primed brand. This was done by visually priming a brand name of a drink during a visual detection task and testing whether the respondents were more inclined to choose the primed brand. It was also studied whether this effect was moderated by thirst.

The study showed that subliminal priming positively influenced participants' choice of the primed brand, but only for participants who were thirsty (Karremans et al, 2006). The study of Smarandescu & Shimp (2015) expands on the research of Karremans, as they studied the effects of subliminal priming on brand choice for a sports drink brand named 'Powerade'. Within this research, three experiments were conducted. Firstly, people were given the choice between Coca Cola, Powerade and Gatorade after being subliminally primed with the word Powerade. It was found that subliminal priming significantly influenced purchase intention when consumers were in an active thirst state. In the second experiment, a similar approach was used in a simulated store environment to provide a more ecologically valid test. The outcomes of this experiment also confirmed that priming significantly affected purchase intention in an active thirst state.

INCREASING PRODUCT PREFERENCE

The research of Difa (2016) explored whether subliminal priming can affect product preference, and whether this effect differs based on respondents' personality traits. Participants were asked to choose which leisure activities they would want to participate in. Beforehand, an online questionnaire was presented. Questions were asked to determine participants' level of sensation seeking. Afterwards, participants were instructed to imagine themselves winning a 'package' of leisure activities and they had to choose one. Before making the choice, they watched a commercial video unrelated to

leisure activities. The video contained either a subliminal prime of the words 'Adventure', 'Seek Adventure' or no prime. The prime was shown once with a duration of 20ms. The results showed that people who were primed had higher tendencies to choose for high sensation seeking activities (i.e. skydiving) compared to people who were not primed. There was no moderating effect found of the level of sensation seeking.

AFFECTING IMPLICIT ATTITUDES

Kam (2007) conducted a study measuring whether subliminal priming could predict political candidate preference through influencing implicit attitudes. In this study, the attitudes of respondents towards Hispanics were measured. Respondents with positive attitudes towards Hispanics were more likely to support the Hispanic candidate. Respondents with negative attitudes towards Hispanics were less likely to support the Hispanic candidate. However, when respondents were exposed to subliminal primes based on their attitude towards Hispanics, the impact of attitudes on political choice was eliminated. Thus, when respondents had negative attitudes towards the Hispanic candidate, positive primes were shown, and vice versa. Respondents were asked to complete tasks during which they were exposed to subliminal primes that paired the words 'Hispanic' and either a positive word such as 'Joy' or a negative word such as 'Cancer' based on their attitudes.

The subliminal priming task consisted of 40 trials, on which respondents were asked to categorize a word as pleasant or unpleasant. The duration of the prime was 40ms, which was followed by positive or negative words, that were shown for 581ms to 956ms based on measured attitudes towards Hispanics. This was done because shorter response latencies should occur when group primes and target words are related to each other. Longer response latencies should occur when group primes and target words are not related (Kam, 2007). In conclusion, results showed that subliminal priming affected implicit attitudes in such a way that the impact of attitudes on political choice was eliminated.

INCREASING DESIRE OF PRODUCTS RELATED TO BASIC NEEDS

Varga L. et al. (2016) conducted a research in which the effects of subliminal priming on the desire of products related to basic needs was studied. The main goals of the paper were to study the effects of different types of visual subliminal primes on a user within an online environment (Varga L. et al., 2016). In this research, participants were subliminally primed while browsing through a website with either positive (e.g., smiley faces), negative (e.g., skulls), mixed primes embedded in the background. Afterwards, they had to rate their desire of having certain products, varying from mountain bikes to weight scales. Based on the results it was concluded that the subliminal primes significantly affected the desire of having primed items, especially when positive subliminal messages were embedded in the background of the website. Furthermore, the desire of products

connected with basic human needs was found to be affected by subliminal stimuli the most (Varga L. et al., 2016). The results give promising insights with regards to the effects of subliminal priming of food products.

Based on the mentioned studies, it is expected that subliminal priming of words that are positively related to animal welfare will increase food choice, purchase intention and feelings of ethical obligation with regards to animal friendly food products. Especially the research conducted by Cooper & Cooper (2002) during which participants were successfully motivated to perform certain behaviour through subliminal text primes in video content seems promising. Furthermore, studies reporting significant effect of subliminal priming on product preference, desire of products related to basic needs, purchase intention and eating behaviour also provide valuable insights for the current research (Strahan et al., 2004; Karremans et al., 2006; Difa, 2016; Varga L. et al., 2016). Accordingly, the following hypothesis was formulated:

> *H.2. Presence of subliminal primes of words positively related to animal welfare increases animal friendly food choice of meat (H2a), dairy (H2b) and vegetarian products (H2c), purchase intention (H2d) and feelings of ethical obligation (H2e) with regards to animal friendly food products, as opposed to when these primes are absent.*

2.3 THE IMPACT OF SUPRALIMINAL- AND SUBLIMINAL PRIMING

In the following paragraphs, an overview of studies implementing both supraliminal- and subliminal priming is given. The insights of these studies will be used to determine whether using both types of priming seems interesting for this research.

BALANCING HEDONIC FOOD THOUGHTS AND DIET GOALS

Papies et al. (2008) conducted a research with the aim of investigating the impact of food cues on restrained eaters' attention for food. In order to do so, two experiments were conducted. The first experiment was designed to test whether pre-exposure to food cues causes an attentional bias for hedonically relevant food products for restrained eaters. Participants were asked to complete a lexical decision task, during which 80 words were presented. To complete the task, participants had to answer whether the words were existing Dutch words or not. The treatment group was exposed to 20 supraliminal text primes of food items (e.g., pizza, cake, chocolate).

After participants completed the lexical decision task, they were asked to complete a probe classification task. In this task, two words were presented simultaneously, followed by a small arrow pointing either upwards or downwards. Participants were instructed to indicate in which ways the arrows were pointing. 20 food and office word pairs and 20 filler word pairs were each presented four times. Thus, the task consisted of 160 trials. As

expected, the pre-exposure to primes of food elicited an attentional bias for hedonic food items in restrained eaters but not for unrestrained eaters.

The second experiment was designed to replicate the results of the first experiment. Additionally, subliminal weight control primes were added to the probe classification task to investigate whether the attentional bias of restrained eaters for hedonic food items could be restored. After each trial the treatment group was exposed to primes of five words related to dieting for 30ms. The results of the first experiment were replicated. Furthermore, the experiment demonstrated that restrained eaters' attentional bias for hedonic food items did not emerge when exposed to subliminal diet related words after pre-exposure to food cues. These results indicate that subliminally primed diet words eliminated the effects of supraliminal primes on restrained eaters (Papies et al., 2008).

In another study, Sato et al. (2019) studied amygdala activation during unconscious visual processing of food. Findings of this study show emotional responses to food images are elicited rapidly, even if people are not consciously aware of the food. Accordingly, it was found that emotional responses were more strongly activated in response to food than mosaic images in both subliminal- and supraliminal priming conditions (Sato et al., 2019). In another study from Sato el al. (2016) it was found that unconscious affective reactions were elicited by the sight of food when presenting food images in the peripheral visual field for 33ms (Sato et al., 2016). More information on these studies can be found in Appendix A.

REDUCING ACCESSIBILITY OF EATING CONTROL GOALS

In the study of Stroebe et al. (2008), the aforementioned research design in the study of Papies et al. (2008) was used. Within this research, two experiments were conducted. The experiments were aimed at studying whether priming "eating enjoyment" decreases the accessibility of eating control concepts. In two of the experiments, participants were asked to complete a similar lexical decision task, during which both supraliminal- and subliminal primes were shown. In the first experiment, participants completed 60 trials, during which they were primed subliminally (23ms).

The primes consisted of diet related words such as 'slank' (slim), 'afvallen' (weight-loss) and 'gewicht' (weight). Participants in the experimental condition were supraliminally primed with words related to eating enjoyment such as 'lekker' (tasty) and 'smakelijk' (appetizing). Respondents in the control condition were primed with neutral words. The same procedure was used in the second experiment, except that respondents had to complete 120 trials. As expected, the results of both experiments showed that priming of eating enjoyment reduces the accessibility of eating control goals for restrained eaters.

Although both types of priming were used in the aforementioned studies, potential interaction effects were not measured. Based on a gap in the literature, it is deemed interesting to analyse whether combining both types of priming would lead to an

interaction effect. It is expected that combining the two types of priming will lead to a positive interaction effect on the dependent variables. Accordingly, the following hypothesis was formulated:

> *H.3. Presence of both supraliminal- and subliminal priming causes an interaction effect which increases animal friendly food choice of meat (H3a), dairy (H3b) and vegetarian products (H3c), purchase intention (H3d) and feelings of ethical obligation (H3e) with regards to animal friendly food products, as opposed to when these primes are absent.*

2.4 THE IMPACT OF ETHICAL OBLIGATIONS

Yoon & Oh (2014) conducted a study with the aim of identifying salient factors that influence consumer's attitude and purchase intention towards ethical products. The research was based on earlier studies which identified various factors that influence ethical consumption. Resulting from their literature review, ethical obligation, self-identity and altruism were found to be the most effective antecedents to predict ethical consumption. Shaw & Shui (2002) also conducted a study on the subject which states that ethical obligation and ethical identity are dominantly influential on ethical consumption with regards to fair trade food products. Huh (2011) replicated Shaw and Shui's study to identify variables affecting the purchase intention of ethical products, such as pro-environmental agricultural goods. These findings also confirmed that ethical obligation and ethical identity are significant influencing factors of ethical consumption. Therefore, in this research, the potential impact of priming on ethical obligation regarding purchasing animal friendly food products will be studied.

2.5 THE IMPACT OF ATTITUDES TOWARDS ANIMAL WELFARE

According to Marquis (2007), priming information stressing positive or negative aspects of divisive issues affect the strength of priming influences. This is caused by a (mis)match between the information bias and a person's own position on the issue, which is likely to influence susceptibility to priming. Because uncongenial information elicits counterarguing, a 'mismatch' between priming information and a person's stance on an issue occurs. This is believed to cause the prime to be processed more deeply and memorable than congenial primes. Furthermore, the extent to which a person's 'likes' or 'dislikes' the priming information also moderates the priming process, because reception, acceptance, encoding, and retrieval of information (Marquis, 2007).

Besides the impact of (un)congenial information, research on priming has also shown that longstanding goals and motivations can be activated by stimuli without intentionality, conscious awareness or control (Bargh et al., 2001; Chartrand et al., 2008; Bargh & Morsella, 2009; Dijksterhuis & Aarts, 2010; Bargh et al., 2012; Hassin, 2013). According to Weingarten et al. (2016), stimuli associated with valued actions that have become routinized may provoke behaviour through motivational principles of goal mediation.

This research showed that priming effects were stronger when respondents valued the outcome of the measured behaviour. Therefore, priming people who highly value animal welfare may influence behaviour with regards to consumption of products that affect animal welfare.

According to Bargh (2002), the occurrence of subliminal effects requires a match between the needs and goals of the respondent and the goal for which priming is used. Van der Pligt & Vliek (2016) also studied whether priming would be effective as an influential technique. According to their research subliminal primes are capable of activating and reinforcing stereotypes, attitudes or norms without conscious knowledge. They stated that when people are motivated to do something, (subliminal) priming may have them an extra push in that direction (van der Pligt & Vliek, 2016). Based on the aforementioned studies, it is expected that attitudes towards animal welfare will positively moderate priming effects. Therefore, the following hypotheses were formulated:

> *H.4. Effects of supraliminal priming on animal friendly food choice of meat (H4a), dairy (H4b) and vegetarian products (H4c), purchase intention (H4d) and feelings of ethical obligation (H4e) with regards to animal friendly food products are stronger for people with positive attitudes towards animal welfare, compared to people with negative attitudes.*
>
> *H.5. Effects of subliminal priming on animal friendly food choice of meat (H5a), dairy (H5b) and vegetarian products (H5c), purchase intention (H5d) and feelings of ethical obligation (H5e) with regards to animal friendly food products are stronger for people with positive attitudes towards animal welfare, compared to people with negative attitudes.*
>
> *H.6. Interaction effects of supraliminal- and subliminal priming on animal friendly food choice of meat (H6a), dairy (H6b) and vegetarian products (H6c), purchase intention (H6d) and feelings of ethical obligation (H6e) with regards to animal friendly food products are stronger for people with positive attitudes towards animal welfare, compared to people with negative attitudes.*

2.6 LAWS AND REGULATIONS

The Dutch government states the following: "directing behaviour through automatic and unconscious thought processes is only permissible if it reinforces the ability of citizens to resist temptations that do not correspond to their own values and goals" (Raad voor Volksgezondheid en Samenleving, 2014). Within this research domain, this could mean that priming people in order to make choices that correspond with their own values and goals would be allowed. Especially because the purpose of this study is not to mislead people into performing behaviours with negative consequences. The purpose of this study is to support consumers in making choices that improve animal welfare. This would also prevent consumers from making decisions that do not correspond with their own values and goals, and even aid in resisting temptations to do so.

2.7 RESEARCH MODEL

In this study, the effects of supraliminal- and subliminal priming on animal friendly food choice, purchase intention and ethical obligation will be studied. A potential interaction effect between the two types of priming will also be measured. Besides, whether attitudes towards animal welfare have a moderating influence on priming effects will be studied. Therefore, the following research model will be central to this study:

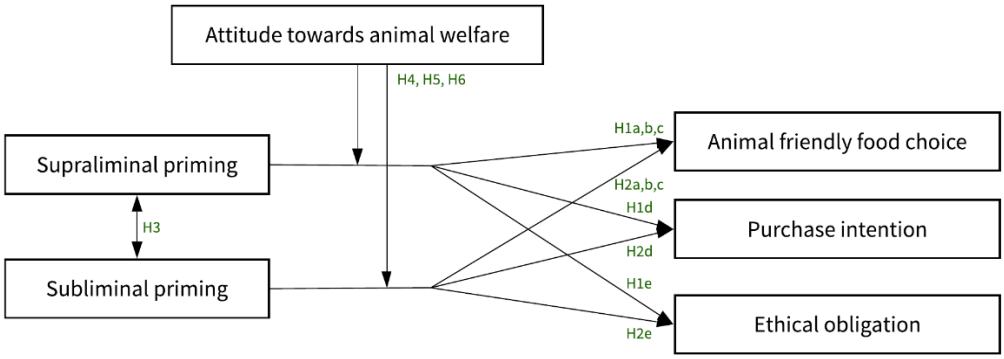


Figure 1 Research model

3. RESEARCH DESIGN AND METHODOLOGY

3.1 RESEARCH DESIGN

This study tested the research model (figure 1) by conducting a 2 (subliminal priming: absent vs. present) x 2 (supraliminal priming: absent vs. present) x 2 (attitude towards animal welfare: negative vs. positive) experimental research design. Within this experiment, the independent variables were manipulated in order to test the effects on food choice, purchase intention and ethical obligation. Participants were randomly assigned to one of four conditions, in which they watched a video containing either both types of priming, one of two types of priming or no priming. Quantitative data was then gathered through a questionnaire, which was used to measure effects on the dependent variables. The questionnaire was also used to measure attitudes towards animal welfare, to test whether it has a moderating influence on priming effects.

Condition	Manipulation	Number of participants
Condition 1	Subliminal- and supraliminal priming	33
Condition 2	Subliminal priming	38
Condition 3	Supraliminal priming	42
Condition 4	No priming	45
	Total number of participants	158

Table 1 Research design

3.2 PROCEDURE

Participants were asked to take part in an experiment, during which they would complete a memorization task and answer questions about product preference. Because this experiment was conducted during the COVID-19 'Coronavirus' pandemic, adequate precautions were taken. The researcher wore a protective face mask, kept at least 1.5 meters distance from participants and carried disinfectant. The experiment was mostly completed on one of two provided tablets. The tablets that were used were 10.5-inch Samsung Galaxy Tab A (2020) tablets with full HD screens and a resolution of 1920x1200 pixels (1080p). After every participation, the tablet was cleaned with disinfectant. Clear standardized instructions were given on the tasks and procedures that the participants had to complete. The researcher emphasized the participants to pay attention to the video and watch it full screen, without pausing and/or replaying.

Due to the pandemic, the precautions and the limited availability of participants, a second approach of gathering participants was used. About 50 participants completed the experiment in class rooms with up to 10 participants at a time. The participants used their own laptops to partake in the study. It was ensured that screen sizes were at least the same or greater than that of the tablets and that the same internet connection was used to prevent quality differences. The researcher gave the same clear standardized instructions and monitored every response to ensure the gathered data was of high quality.

Participants entered the experiment through Qualtrics. When visiting the provided Qualtrics link, the participant was told that the study was aimed at testing to what extent people can memorize recipes from cooking videos. They were also told that questions would be asked about product preference. At the beginning of the experiment, a few demographic questions were asked. These questions were about their age, their gender and their highest level of education. After answering these questions, the participants viewed one of the four videos, which was randomly selected through a 'Survey Flow' in Qualtrics. During the video, of which the duration was 114 seconds, the participant was either exposed to both supraliminal and subliminal primes, one type of primes or no primes.

When the video was finished, participants completed the memorization task. For every meal, they had to answer which ingredients were used. Eight options were given per meal, with four of those options being ingredients that were used and four options being fillers. After completing the task, the participant was asked to choose preferred food products. Participants chose products based on what they would use to prepare a certain meal. For example, they could choose between two packages of minced beef to prepare 'spaghetti Bolognese'. In total, nine products had to be chosen. The given options consisted of three choices between two meat products, three choices between two dairy products and three choices between meat and vegetarian products. One of the two products included signs of animal friendly production such as a 'Beter Leven Keurmerk' (Better Life label), a 'Bio' sign and green packaging (figure 2). The other package included no signs of animal friendly production (figure 3).

Figure 2 Animal friendly food choice

Figure 3 Regular food product

After participants chose their preferred food products, they were asked to answer various questions measuring attitudes towards animal welfare, purchase intentions and feelings of ethical obligation regarding animal friendly food products. When the experiment was completed, participants were debriefed, and the actual goal of the study was disclosed. The opportunity was given to ask the researcher questions about the study in person, to leave an e-mail address to receive results or to leave a question or remark at the end of the questionnaire.

3.3 STIMULI

In order to test the four different conditions, four cooking videos were created, all displaying the preparation of the same three meals. These cooking videos were edited with video-editing software (Adobe Premiere Pro). During these videos, viewers were guided step-by-step on how to prepare the three meals. Participants were exposed to either both supraliminal- and subliminal priming, one type of priming or no priming. The words that were used as text primes were based on a pre-test, which is described in the following paragraph. Afterwards, detailed insights of all supraliminal- and subliminal primes will be provided.

3.3.1 PRE-TEST

A pre-test was conducted in order to study the extent to which participants positively associate words with animal welfare. To do so, a questionnaire was created with the use of Qualtrics, which was distributed through online social media networks. 31 participants between the age of 18 and 34 entered the questionnaire, of which 21 successfully finished it (mean age is 24.9 years). Firstly, participants were asked to fill in five words they positively associate with animal welfare. An overview of words filled in by participants can be found in Appendix B. Words that were deemed irrelevant to this study and not suited for the experiment were left out (e.g., 'veterinarian', 'animal police').

Secondly, a list consisting of 17 words was provided, which participants had to rank from least to most positively related to animal welfare. This list was created with the use of Dutch animal welfare related websites from organisations such as 'Dierenbescherming' and 'Wakker Dier'. Furthermore, online grocery shops such as 'Albert Heijn' and 'Jumbo' were consulted to study which words are used to indicate whether products were produced in an animal friendly manner.

Based on the outcomes of this pre-test, words were selected for priming manipulations. This was done by combining the frequency of which words were listed in the first task and the ranking of words obtained from the second task. This led to the following selection of words that were used for priming manipulations: 'diervriendelijk' (animal friendly), 'biologisch' (biological), 'drie sterren Beter Leven keurmerk' (Three-star Better Life label) and 'vegetarisch' (vegetarian). The results of the pre-test can be found in Appendix B.

3.3.2 SUPRALIMINAL- AND SUBLIMINAL PRIMES

Supraliminal primes consisted of the four mentioned animal welfare related words (e.g., diervriendelijk), which were shown three times with a duration of 1500ms per prime. The same words were used as subliminal primes, with a duration of 33ms. A meta-analysis on priming studies showed that priming effects are more likely to occur with repeated primes

than with novelty primes (van den Bussche et al., 2009). Therefore, four words were shown three times, both as supraliminal and subliminal primes.

Throughout the video, the same font was used for all textual elements, including primes. In the condition with both supraliminal and subliminal primes, there was an interval of approximately 4 seconds between primes. In all conditions, primes were exactly the same, to prevent unreliable results caused by differences between primes. The timeline below shows which primes were shown at what times throughout the videos (figure 4). The entire timeline including all 24 primes can be found in Appendix C.

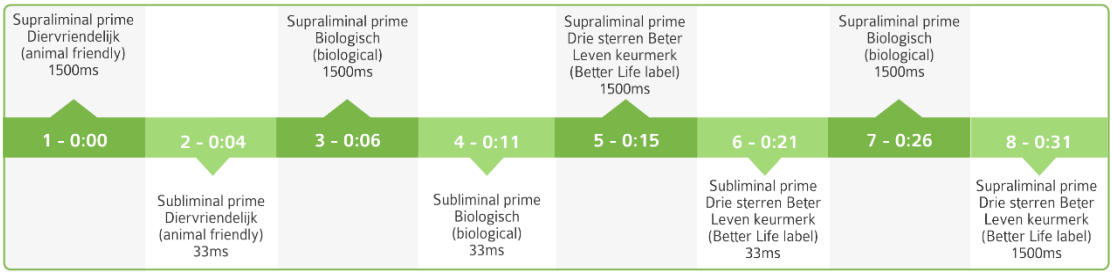


Figure 4 Timeline of first eight primes

3.3.3 SUBLIMINAL PRIMING MANIPULATION

Participants in the subliminal priming conditions were exposed to twelve words positively related to animal welfare, with a duration of 33ms each (e.g., biological). The amount (Cooper & Cooper., 2002; Papies et al., 2008; Sato et al., 2019), duration (Cooper & Cooper, 2002; Kam, 2007; Papies et al., 2008; Difa, 2016; Gorp, 2017; Sato et al., 2019) and types (Strahan et al., 2002; Strahan et al., 2004; Karremans et al., 2006; Kam, 2007; Veltkamp et al., 2011; Difa, 2016) of primes were based on prior research. In the mentioned studies, participants were primed subliminally by the use of text primes. Priming with images was also considered, but due to technical limitations it was chosen to only include text primes.

Subliminal primes were always placed based on where the preparation of the meal was taking place in order to ensure that they would be in the field of view of the participant. To prevent primes from being too obvious, they were coloured similarly as their background, with enough contrast to be easily readable (figure 5). Participants always viewed the video in full screen, to ensure proper readability of primes. All subliminal primes had the same font size (25px) and were always shown after transitions of camera shots so they were less notable.

Figure 5 Subliminal prime 'drie sterren Beter Leven keurmerk' ('Three-star Better Life label', screenshot, 33ms)

3.3.4 SUPRALIMINAL PRIMING MANIPULATION

Supraliminal primes consisted of the same twelve words, to ensure that results would not be affected by differences between primes. Based on prior research, twelve supraliminal primes with a duration of 1500ms each would be a suitable amount for this intervention (Stroebe et al., 2008; Papies et al., 2008; Sato et al., 2019). The primes were shown at the beginning and the end of the video, during transitions between meals and in the top right corner (figure 6). These placements were based on what would seem to be natural places for text to occur, as ingredients were also shown in the top right corner. This was done in order to prevent participants from distinguishing the primes and recognizing their purpose. An example of a supraliminal prime is shown in figure 6, in which a duck breast was used as an ingredient with the text "drie sterren Beter Leven keurmerk" (Three-star Better Life label) in the top right corner. All supraliminal primes had the same font size (50px).

Figure 6 Supraliminal prime "Drie sterren Beter Leven keurmerk" ('Three-star Better Life label', screenshot, 1500ms)

3.4 MEASURES

3.4.1 ANIMAL FRIENDLY FOOD CHOICE

To measure participants' food choice a questionnaire was developed by the use of Qualtrics. After watching the video, participants completed a memorization task. Thereafter, they selected a food product which they would use to prepare a certain meal, from two options varying in 'animal-friendliness'. For example, two packages of minced beef were shown. The participant was asked to choose the product he or she would use to prepare "spaghetti Bolognese". As mentioned, one of the two options did not include any sign of animal friendly production (figure 7). The other product had green packaging, a 'Beter Leven keurmerk' (Better Life label) and a 'Bio' sign (figure 8). To study if effects would differ between product types, three product types including dairy, meat and vegetarian products were used. Each product type included three choices between two options. The products were shown in a random order. To avoid biased results, participants always chose between similar products (e.g., figure 7 and 8). Products did not or minimally vary in taste, quantity, caloric content and branding.

Figure 7 standard minced beef

Figure 8 'animal friendly' minced beef

3.4.2 ATTITUDES TOWARDS ANIMAL WELFARE

Attitudes towards animal welfare were measured to study whether they moderate priming effects. To do so, two scales derived from Cembalo et al. (2015) and Herzog et al. (2015) were used consisting of a total of 28 items. For this study, seven items measuring attitudes towards animal welfare related to food choice were selected (e.g., "It is important that the food I normally eat has been produced in a way that animals have not experienced pain"). Participants responded to these statements using a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5).

3.4.3 ETHICAL OBLIGATION

To measure whether feelings of ethical obligation with regards to animal friendly food products could be affected by priming, three scales derived from Gärling et al. (2003), Bamberg et al. (2007) and Sunderer and Rössel (2012) were used. For this study, a total

of 8 items were selected (e.g., "I feel obliged to buy animal friendly food products"). The same five-point Likert scale was used to measure responses.

3.4.4 PURCHASE INTENTION

To investigate if purchase intention could be affected by priming, two scales derived from Ariff et al. (2014) and de Graaf et al. (2016) were used. The scales were combined and reduced from 7 to 6 items based on one item not being relevant for this research. The construct aimed at measuring purchase intention of animal friendly food products (e.g., "I plan to buy animal friendly food products"). Again, the five-point Likert scale was used to measure responses.

In table 2, the number of items and the authors for dependent measures are stated. The final items after factor analysis can be found in Appendix D.

Dependent measures	N	Example item(s)	Authors
Attitude towards animal welfare	7	"I believe that more regulations are needed for the treatment of livestock"	(Cembalo et al., 2015; Herzog et al., 2015)
Purchase intention	6	"I plan to buy animal friendly food products"	(Ariff et al., 2014; Graaf et al., 2016)
Ethical obligation	8	"I feel obliged to buy animal friendly food products"	(Gärling et al., 2003; Bamberg et al., 2007; Sunderer and Rössel, 2012)

Table 2 Overview of dependent measures

3.5 PARTICIPANTS

This study focused on people between the age of 18- and 34-years old living in The Netherlands. Therefore, the language used in the online experiment was Dutch. The study was focused on this age group because they consume the most online food related content (Delgado et al., 2014; Google, 2017; Google, 2018), purchase the most food products through online channels (Multiscope, 2020) and are the biggest consumers of animal friendly food products (Voedingscentrum, 2016; Keuchenius & de Graaf, 2017). Participants were approached at Saxion in Deventer (The Netherlands), which is a university of applied sciences. A total of (N = 158) participants were recruited as they voluntarily agreed to partake in the experiment. Participants were required to speak and understand Dutch. Table 3 shows the number of participants per condition, the means and standard deviations of their age and the distribution of gender and level of education.

Condition	Manipulation	N =	Age	Gender	Level of education
1	Subliminal- and supraliminal priming	33	M = 20.42, SD = 2.25	Male (57.6%) Female (42.4%)	Havo/vwo (54.5%) mbo (42.4%) hbo (3%)
2	Subliminal priming	38	M = 20.58, SD = 3.10	Male (55.3%) Female (44.7%)	Havo/vwo (65.8%) mbo (26.3%) hbo (7.9%)
3	Supraliminal priming	42	M = 20.17, SD = 1.96	Male (61.9%) Female (38.1%)	Havo/vwo (59.5%) mbo (33.3%) hbo (4.8%) vmbo/mavo (2.4%)
4	No priming	45	M = 20.09, SD = 2.13	Male (51.1%) Female (48.9%)	Havo/vwo (60.0%) mbo (37.8%) hbo (2.2%)
Total		158	M = 20.30, SD = 2.37	Male (56.3%) Female (43.7%)	Havo/vwo (60.1%) mbo (34.8%) hbo (4.4%) vmbo/mavo (.7%)

Table 3 Overview of participants and demographic data

In order to ensure that groups did not significantly differ between age, gender and level of education, various analyses were performed. Firstly, an ANOVA was conducted which shows there was so significant difference in age between groups ($F(3,154) = .364$, $p = .779$). Secondly, chi-square tests were conducted which show no significant variation between groups in the distribution of gender $\chi^2(3, N = 158) = 1.07$, $p = .785$ and level of education $\chi^2(9, N = 158) = 6.30$, $p = .710$.

3.6 CONSTRUCT VALIDITY AND RELIABILITY

In order to determine whether the questionnaire measured what it was supposed to measure, the validity of constructs was tested. Accordingly, a factor analysis was conducted. The validity of the initial 21 items was measured using a principal component analysis. For an item to be considered significant, the factor loading value had to be equal to or exceed .70. Thus, to increase construct validity, items with low loading values were discarded.

The analysis resulted in the items of the attitude scale loaded in two factors instead of one, which resulted in a total of four factors instead of the expected three factors. After discarding items with low Cronbach's Alpha values, three factors remained. All items measuring purchase intention had high reliability values and where retained. Three out of six items of ethical obligation showed to have rather low reliability ($\alpha < .57$) and loaded in various constructs. Thus, these items were discarded. Three items measuring attitudes were also deemed unreliable ($\alpha < .56$), loaded into various constructs, and thus were discarded. The four remaining items loaded into two constructs, due to two items being negatively worded. These two items were discarded based on lower reliability scores. The final factor analysis can be found in Appendix D.

The initial eigenvalues from the factor loadings were all above 1. The total explained variance for all factors is 75.9%. Lastly, all factors have a high Cronbach's Alpha value ($\alpha > .70$). These results can also be found in Appendix D.

3.7 ANALYSES

In order to analyse the results from the experiment, a multivariate analysis of variance (MANOVA) was conducted. Accordingly, the main effects of supraliminal- and subliminal priming, the interaction effect and the moderation effect of attitudes towards animal welfare were analysed. A minimal significance level (p) of 0.05 was needed to conclude that the dependent variables were significantly affected by priming. Furthermore, descriptive analysis was performed in order to analyse differences between means of dependent variables and to discover potential patterns of priming effects.

Afterwards, univariate analyses of variance (ANOVA) were performed for all dependent variables to analyse priming effects. Doing so, the extent to which a dependent variable was affected by supraliminal- and/or subliminal priming could be determined. Additionally, profile plots were studied to gain further insights into the effects of priming. Lastly, an overview of descriptive statistics on the effects of priming was visualized which also provided valuable insights into the results of this study.

4. RESULTS

In order to analyse the main effects of priming, a multivariate analysis of variance (MANOVA) was conducted. This analysis was performed to study effects of the independent variables subliminal priming and supraliminal priming on the dependent variables food choice, purchase intention and ethical obligation. It was also studied whether attitudes towards animal welfare moderated priming effects. Results of the MANOVA are shown in table 4. Based on the analysis it can be concluded that there were no significant main effects of subliminal priming ($F(5, 146) = .72$, p = .608, Wilks' Lambda = .98) and supraliminal priming ($F(5, 146) = 1.01$, $p = .366$, Wilks' Lambda = .96) on the dependent variables. There was also no significant interaction effect between supraliminal- and subliminal priming ($F(5, 146) = .15$, $p = .981$, Wilks' Lambda = .99).

Analysis of the moderating effect of attitudes towards animal welfare on strength of priming effects show a marginal effect on supraliminal priming effects ($F(5, 146) = 2.02$, $p = .080$, Wilks' Lambda = .94). This finding can be explained by a significant effect on ethical obligation (p = 0.16) and other substantial but non-significant effects. Plots visualizing these effects can be found in Appendix E. Lastly, no moderating effect of attitudes on subliminal priming effects ($F(5, 146) = .65$, $p = .661$, Wilks' Lambda = .98) or interaction effects were found ($F(5, 146) = .99$, $p = .426$, Wilks' Lambda = .97).

Condition	Wilks' Lambda	*F*-value	*p*
Subliminal priming	.976	.722	.608
Supraliminal priming	.964	1.095	.366
Subliminal priming * supraliminal priming	.995	.145	.981
Subliminal priming * attitude	.978	.652	.661
Supraliminal priming * attitude	.935	2.015	.080
Subliminal priming * supraliminal priming * attitude	.967	.990	.426

Table 4 MANOVA results on main effects

Based on the results as seen in table 5, it was found that mean scores of dependent variables are mostly higher in priming conditions compared to the condition without primes. This would indicate that priming positively affected the dependent variables in most instances, but effect sizes were not substantial enough to be deemed significant based on the performed analysis.

Condition	Dependent variable				
	Purchase intention	Ethical obligation	Food choice (meat)	Food choice (dairy)	Food choice (vegetarian)
No priming	M = 2.99, SD = .87	M = 3.39, SD = .67	M = 1.07, SD = 1.27	M = .49, SD = .87	M = .60, SD = 1.01
Supraliminal priming	M = 3.10, SD = .92	M = 3.32, SD = .83	M = 1.07, SD = .13	M = .83, SD = 1.15	M = .55, SD = 1.02
Subliminal priming	M = 3.19, SD = .92	M = 3.41, SD = .73	M = 1.39, SD = 1.35	M = .87, SD = 1.23	M = .95, SD = 1.21
Interaction	M = 3.29, SD = .85	M = 3.43, SD = .80	M = 1.42, SD = 1.32	M = 1.03, SD = 1.26	M = .85, SD = 1.15

Table 5 Overview of conditions and scores of dependent variables

4.1 FOOD CHOICE OF MEAT PRODUCTS

A univariate analysis of variance (ANOVA) was conducted in order to test the effects of supraliminal- and subliminal priming on food choice of meat products. The extent to which attitudes towards animal welfare affected priming effects was also studied. It was expected that the presence of primes would positively affect animal friendly food choice of meat products, and that the strength of priming effects would be moderated by attitudes. The results show that supraliminal priming did not significantly affect choice of animal friendly meat products ($F(1, 150) = .027$, $p = .869$). Thus, hypothesis 1a was rejected.

Likewise, no significant effect of subliminal priming was found ($F(1, 150) = 1.88$, $p = .173$). Hypothesis 2a was also rejected. Furthermore, no interaction effect between the two types of priming was found ($F(1, 150) = .02$, $p = .966$). Therefore, hypothesis 3a was also rejected. Lastly, results show that effects of supraliminal priming ($F(1, 150) = .04$, $p = .949$), subliminal priming ($F(1, 150) = 2.22$, $p = .138$) and the interaction effect ($F(1, 150) = .04$, $p = .849$) were not moderated by attitudes towards animal welfare. Thus, hypotheses 4a, 5a and 6a were rejected.

Condition	*F*-value	*p*
Supraliminal priming	.027	.869
Subliminal priming	1.879	.173
Subliminal priming * supraliminal priming	.002	.966
Supraliminal priming * attitude	.004	.949
Subliminal priming * attitude	2.221	.138
Subliminal priming * supraliminal priming * attitude	.036	.849

Table 6 Overview of priming effects on animal friendly food choice (meat)

Analysis of profile plots shows that the mean score of animal friendly food choice of meat products is substantially higher when subliminal primes are present and attitudes towards animal welfare are positive (figure 9). When attitudes are negative, almost no effect of subliminal priming is found. Nonetheless, effects are not strong enough to be deemed significant ($p = .138$).

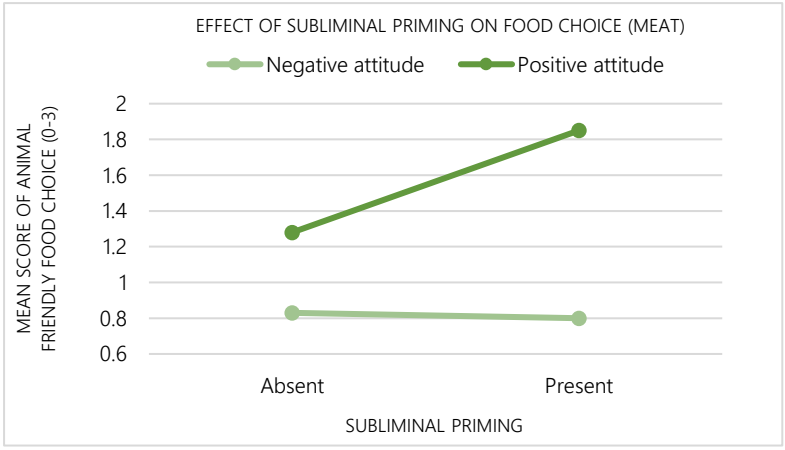


Figure 9 Effect of subliminal priming on food choice (meat) moderated by attitude

4.2 FOOD CHOICE OF DAIRY PRODUCTS

To study whether supraliminal- and subliminal priming affect food choice of dairy products, another ANOVA was conducted. The extent to which attitudes towards animal welfare affected priming effects was also investigated. It was expected that the presence of primes would positively affect animal friendly food choice of dairy products, and that the strength of priming effects would be moderated by attitudes. The results show that supraliminal priming did not significantly affect choice of animal friendly dairy products ($F(1, 150) = 1.69$, $p = .196$). Therefore, hypothesis 1b was rejected.

Subliminal priming did also not lead to a significant effect on food choice ($F(1, 150) = 1.71$, $p = .192$), based on which hypothesis 2b was rejected. Furthermore, no interaction effect of both types of priming on choice of dairy products was found ($F(1, 150) = .30$, $p = .583$). Thus, hypothesis 3b was also rejected. Similarly, results show that effects of supraliminal priming ($F(1, 150) = 1.79$, $p = .183$), subliminal priming ($F(1, 150) = 1.73$, $p = .191$) and the interaction effect ($F(1, 150) = .08$, $p = .773$) were not moderated by attitudes. Therefore, hypotheses 4b, 5b and 6b were also rejected.

Condition	*F*-value	*p*
Supraliminal priming	1.687	.196
Subliminal priming	1.714	.192
Subliminal priming * supraliminal priming	.302	.583
Supraliminal priming * attitude	1.786	.183
Subliminal priming * attitude	1.726	.191
Subliminal priming * supraliminal priming * attitude	.084	.773

Table 7 Overview of priming effects on animal friendly food choice (dairy)

Analysis of profile plots show that the mean score of animal friendly food choice of dairy products is considerably higher when supraliminal- or subliminal primes are present and attitudes towards animal welfare are positive (figure 10 and 11). When attitudes are negative, almost no effects of supraliminal- or subliminal priming are found. Interestingly, both types of priming show a very similar effect. Nonetheless, the effects are not substantial enough to be deemed significant ($p = .183$, $p = .191$).

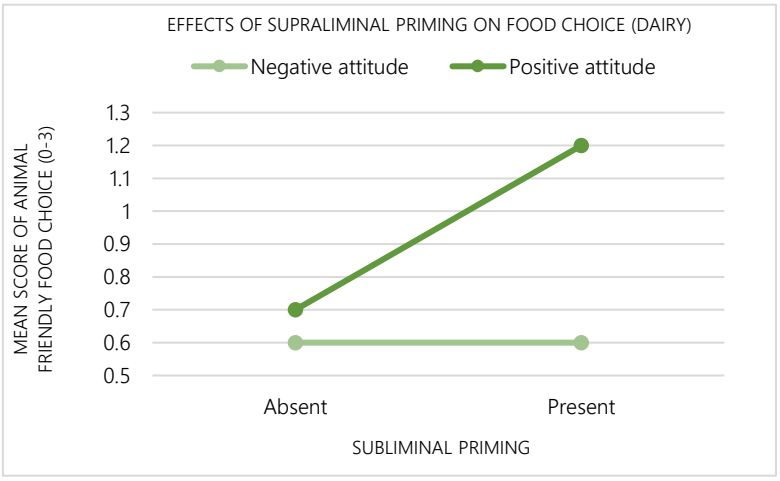


Figure 10 Effects of supraliminal priming on food choice (dairy) moderated by attitude

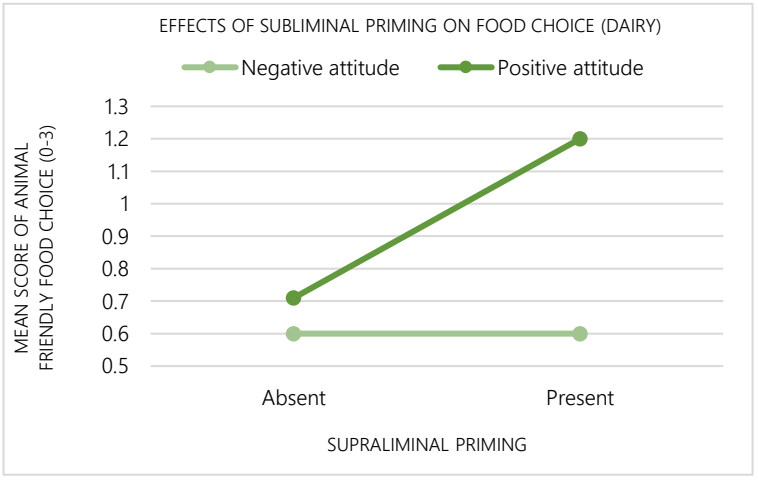


Figure 11 Effects of subliminal priming on food choice (dairy) moderated by attitude

4.3 FOOD CHOICE OF VEGETARIAN PRODUCTS

An ANOVA was conducted to test the effects of supraliminal- and subliminal priming on food choice of vegetarian products. Again, the extent to which attitudes towards animal welfare affected priming effects was studied. It was expected that the presence of these primes would positively affect food choice of vegetarian products, with the strength of priming effects being moderated by attitudes. The results show that supraliminal priming did not significantly affect food choice of vegetarian products ($F(1, 150) = .20$, $p = .659$). Thus, hypothesis 1c was rejected.

Subliminal priming did also not significantly affect choice of vegetarian products ($F(1, 150) = 2.43$, $p = .121$), due to which hypothesis 2c was rejected. Furthermore, no interaction effect of the two types of priming was found ($F(1, 150) = .00$, $p = .972$). Therefore, hypothesis 3c was also rejected. Lastly, the results show that effects of supraliminal priming ($F(1, 150) = .94$, $p = .334$), subliminal priming ($F(1, 150) = 1.21$ $p = .273$) and the interaction effect ($F(1, 150) = 2.24$, $p = .136$) were not moderated by attitudes. Based on these findings, hypotheses 4c, 5c and 6c were also rejected.

Condition	*F*-value	*p*
Supraliminal priming	.196	.659
Subliminal priming	2.429	.121
Subliminal priming * supraliminal priming	.001	.972
Supraliminal priming * attitude	.938	.334
Subliminal priming * attitude	1.211	.273
Subliminal priming * supraliminal priming * attitude	2.243	.136

Table 8 Overview of priming effects on animal friendly food choice (vegetarian)

Analysis of profile plots shows that the mean score of food choice of vegetarian products is higher when subliminal primes are present and attitudes towards animal welfare are positive (figure 12). The effect is even stronger when supraliminal priming is absent and attitudes are positive, as seen in figure 13. Nevertheless, the effects were not strong enough to be deemed significant ($p = .121$, $p = .136$).

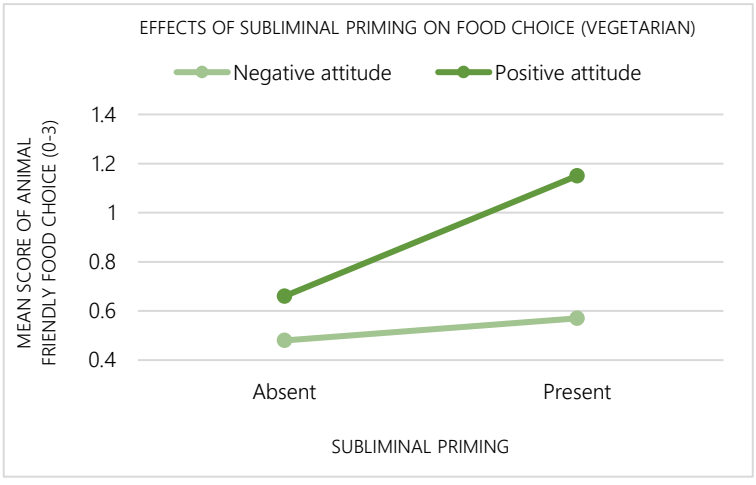


Figure 12 Effects of subliminal priming on food choice (vegetarian) moderated by attitude

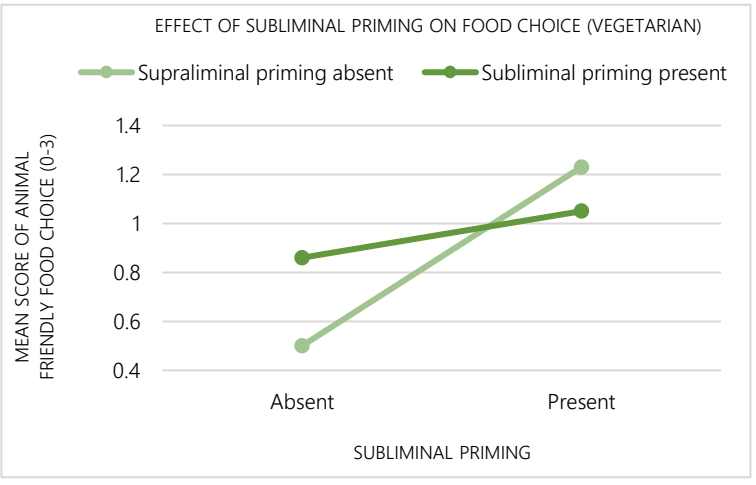


Figure 13 Effect of subliminal priming on food choice (vegetarian) with positive attitudes

4.4 PURCHASE INTENTION

The effects of supraliminal- and subliminal priming on purchase intention were also tested by conducting an ANOVA. Similarly, the extent to which attitudes towards animal welfare affected priming effects was studied. It was expected that the presence of these primes would positively affect purchase intention of animal friendly food products, with the strength of priming effects being moderated by attitudes. The results show that supraliminal priming did not significantly affect purchase intention ($F(1, 150) = 1.49$, $p = .225$). Thus, hypothesis 1d was rejected. Purchase intention was also not significantly affected by subliminal priming ($F(1, 150) = 1.04$ $p = .310$), due to which hypothesis 2d was rejected.

Furthermore, no interaction effect of both types of priming was found ($F(1, 150) = .14$, $p = .708$). Therefore, hypothesis 3d was rejected. Lastly, the results show that effects of supraliminal priming ($F(1, 150) = .05$, $p = .821$), subliminal priming ($F(1, 150) = .58$, $p = .446$) and the interaction effect ($F(1, 150) = .75$, $p = .387$) were not moderated by attitudes. Based on these results, hypotheses 4d, 5d and 6d were rejected.

Condition	*F*-value	*p*
Supraliminal priming	1.040	.310
Subliminal priming	1.485	.225
Subliminal priming * supraliminal priming	.141	.708
Supraliminal priming * attitude	.051	.821
Subliminal priming * attitude	.583	.446
Subliminal priming * supraliminal priming * attitude	.752	.387

Table 9 Overview of priming effects on purchase intention

4.5 ETHICAL OBLIGATION

The effects of supraliminal- and subliminal priming on ethical obligation were also measured by conducting an ANOVA. It was expected that the presence of primes would positively affect feelings of ethical obligation regarding purchasing animal friendly food products, with the strength of priming effects being moderated by attitudes. Based on the results it can be concluded that no significant effect was found of supraliminal priming on ethical obligation ($F(1, 150) = .08$, $p = .779$). Therefore, hypothesis 1e was rejected. Subliminal priming did also not significantly affect ethical obligation ($F(1, 150) = .10$, $p = .758$). Thus, hypothesis 2e was rejected. No interaction effect of the two types of priming was found ($F(1, 150) = .00$, $p = .923$), due to which hypothesis 3e was rejected.

However, it is notable that supraliminal priming effects on ethical obligation were significantly moderated by attitudes ($F(1, 150) = 5.89$, $p = .016$). Analysis of profile plots show that the mean score of feelings of ethical obligation regarding purchasing animal friendly food products is higher when supraliminal primes are present and attitudes on animal welfare are positive (figure 14). Interestingly, means are lower when primes are present and attitudes are negative. This led to a significant outcome of effects of supraliminal priming on ethical obligation moderated by attitudes ($p = .016$). Hypothesis 4e can thus be accepted. This finding will be expanded upon in the discussion section. Lastly, effects of subliminal priming ($F(1, 150) = .00$, $p = .986$) and the interaction effect ($F(1, 150) = .04$, $p = .839$) were not moderated by attitudes. Based on these findings, hypotheses 5e and 6e were rejected.

Condition	*F*-value	*p*
Supraliminal priming	.079	.779
Subliminal priming	.095	.758
Subliminal priming * supraliminal priming	.009	.923
Supraliminal priming * attitude	5.892	.016
Subliminal priming * attitude	.000	.986
Subliminal priming * supraliminal priming * attitude	.042	.839

Table 10 Overview of priming effects on ethical obligation

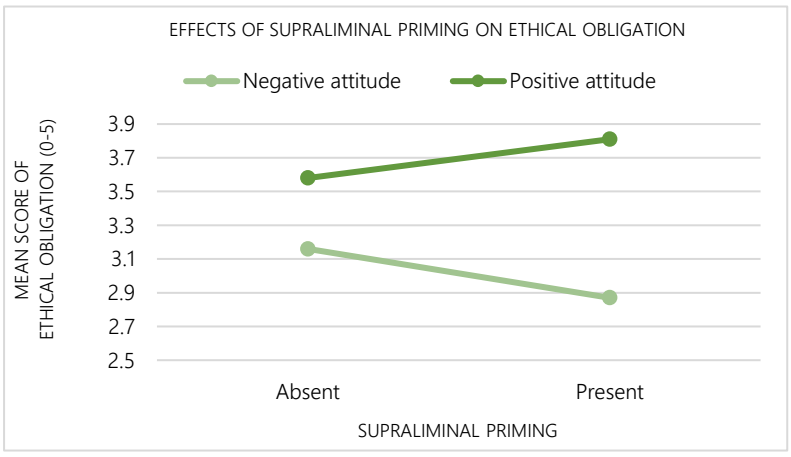


Figure 14 Effects of supraliminal priming on feelings of ethical obligation moderated by attitude

4.6 CONCLUSION

In conclusion, no main effects were found of supraliminal- or subliminal priming on the dependent variables. Although, examination of the moderation effect of attitudes towards animal welfare on supraliminal priming effects showed marginal statistical significance (p = .08). Accordingly, a significant moderation effect of attitudes on supraliminal priming effects on ethical obligation was found (p = .016). As mentioned, this finding will be expanded upon in the discussion section. Furthermore, analysis of profile plots showed that effects of both supraliminal- and subliminal priming were greater when attitudes towards animal welfare were positive. These findings were not deemed significant, but an interesting pattern was discovered. Lastly, as seen in figures 15 & 16, mean scores of dependent variables were mostly higher in priming and interaction conditions. Effects were not strong enough to lead to significant findings, but these results will be expanded upon in the discussion section as they seem promising for future research.

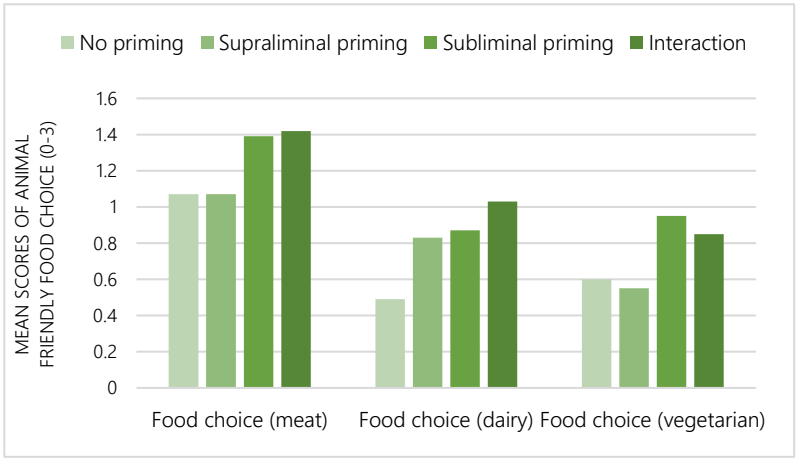


Figure 15 Mean scores of food choice of meat, dairy and vegetarian products

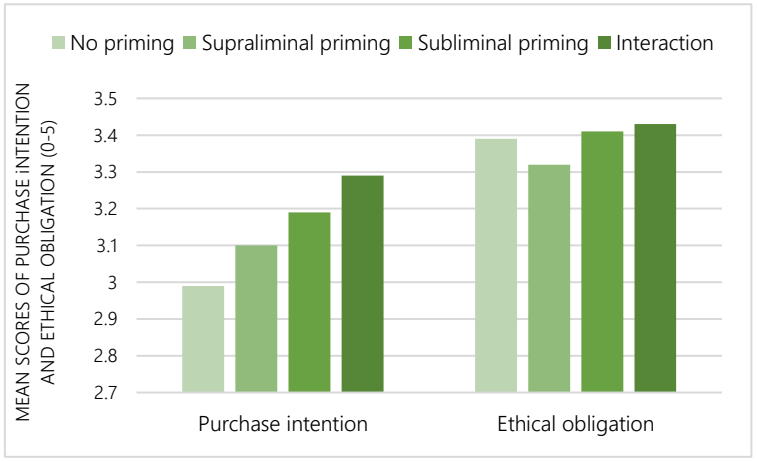


Figure 16 Mean scores of purchase intention and ethical obligation

5. DISCUSSION

This research investigated the extent to which supraliminal priming and subliminal priming can positively affect food choice, purchase intention and feelings of ethical obligation regarding animal friendly food products. Based on prior studies, it was expected that both types of priming would positively affect the dependent variables. It was also expected that combining both types of priming would lead to an interaction effect and that attitudes towards animal welfare would moderate priming effects. The latter was confirmed as results showed marginal and significant moderation effects. No other significant effects were found. The findings of this research will be discussed in the following section in order to identify potential implications, limitations and recommendations for future research.

5.1 DISCUSSION OF RESULTS

This research resulted in a marginal moderation effect of attitudes on supraliminal priming effects, with a significant effect on ethical obligation. Analysis of descriptive statistics also show promising patterns of priming effects, which will be expanded upon. Unexpectedly, no significant main effects of supraliminal priming on food choice, purchase intention and feelings of ethical obligation regarding animal friendly food products were found.

The outcomes of main effects were not consistent with expectations based on prior research, which showed that eating behaviour and product preference can be affected by supraliminal priming (Papies & Hamstra, 2010; Fukawa & Niedrich, 2015; Minas et al., 2016; Versluis & Papies, 2016). The findings also show no evidence of subliminal priming affecting the dependent variables, which is also not in line with the literature. Prior research showed how subliminal priming can affect product choice, eating and drinking behaviour, purchase intention and product preference (Strahan et al., 2002; Strahan et al., 2004; Karremans et al., 2006; Veltkamp et al., 2011; Difa, 2016; Varga L. et al. 2016). Although, it is notable that scores of all dependent variables were higher in the subliminal priming condition.

In order to investigate whether combining supraliminal and subliminal priming could lead to significant priming effects, a potential interaction effect between the two types of priming was measured. This was done based on a gap in prior research, in which both types of priming were used in various studies, but potential interaction effects were not measured (Papies et al., 2008; Stroebe et al., 2008; Sato et al., 2019). It was expected that combining the two types of priming would lead to stronger priming effects. The results show that no significant interaction effect was found. Nonetheless, the descriptive statistics show that all of the mean scores of dependent variables except for food choice of vegetarian products were the highest in the interaction condition. As both types of priming did not significantly affect the dependent variables

independently, studying whether an interaction effect would occur if significant priming effects were found seems interesting for future research.

The lack of significant effects of supraliminal priming, subliminal priming and the potential interaction effect could be explained because of differences in the research design compared to the mentioned studies. In most studies, participants were exposed to primes while performing tasks that were cognitively challenging. These tasks most likely required more cognitive effort than the experiment at hand. As primes were shown in a highly engaged state in these studies, this could have resulted in stronger effects. Contrary to other studies in which the duration of tasks was dependent on the participant, the duration of the manipulation in this research was under two minutes. On the other hand, as marginal and significant effects were found caused by a manipulation of only two minutes, this offers promising insights for future research.

Furthermore, prior research is mostly focused on affecting behaviour such as decreasing consumed calories or increasing purchase intention of an unknown branded product through priming. This study was aimed at changing people's food choice to improve animal welfare, which can be considered a complex ethical dilemma. While people most likely want to improve animal welfare, they could have reasons for not performing corresponding behaviour. Accordingly, various respondents defended their reasoning not to purchase animal friendly food products after participating in the experiment. Therefore, as the dependent variables in this study are tied to a complex issue, they might have been harder to affect through priming. Although, taking everything into account, this research has nevertheless produced marginal and significant results. Thus, it offers valuable and promising insights for future research on priming.

Based on findings and a gap in prior research it was decided to measure if attitudes towards animal welfare could moderate priming effects. The study of Marquis (2007) stated that the extent to which a person 'likes' the information that is being primed also moderates the priming process, because reception, acceptance, encoding, and retrieval of information is facilitated. Additionally, the research of Weingarten et al. (2016) showed that priming effects depend on valuation of the subject at hand (stronger effects for higher value). The outcomes of this study showed no significant main effects of attitudes on effects of supraliminal priming, subliminal priming and the interaction effect.

Although, as mentioned, results on the moderating effect of attitudes towards animal welfare on supraliminal priming effects were marginally significant. Also, a significant moderation effect of attitudes on supraliminal priming effects on ethical obligation was found. These findings are in line with the mentioned studies (Marquis, 2007) (Weingarten, et al., 2016). This could be explained by attitudes towards animal welfare moderating the way supraliminal primes were processed, which in turn increased feelings of ethical obligation regarding purchasing animal friendly food products

(Marquis, 2007). The findings could also be explained by that priming effects depend on valuation of the subject (Weingarten, et al., 2016). Interestingly, feelings of ethical obligation decreased when attitudes towards animal welfare were below average.

After completing the experiment, various respondents expressed they would consider purchasing animal friendly food products if the price gap between these products and regular food products decreased. Likewise, multiple respondents stated that due to the price differences; they feel purchasing animal friendly food products is not feasible because they cannot afford them. This would explain why a significant effect was found for ethical obligation, while no effects were found for purchase intention and food choice. It could be that when perceived behavioral control is too low, priming is not affective in changing intentions or behaviour. This would be in line with prior research, which suggests that perceived behavioral control is a direct predictor of both intentions and behaviour (Armitage and Conner, 2001) . Armitage and Conner (2001) state that the feelings of control predict the degree to which individuals are willing to apply additional effort to successfully perform a particular behaviour. Thus, ethical obligation could be affected due to an increased feeling that one should contribute to improving animal welfare. Regarding the concerns about pricing, the average respondent being a 20-year-old student should also be taken into account, as younger people most likely on average have less money to spend on groceries.

Moreover, as improving animal welfare is an ethical issue, supraliminal priming could have reinforced negative thoughts and feelings. If people feel morally pressured to change their behaviour to improve animal welfare, but are unwilling or unable to do so, negative effects of priming could be explained. Although mostly non-significant, moderation analysis generally shows negative effects of priming on the dependent variables when attitudes towards animal welfare were negative. This would be in line with prior research, with states uncongenial information elicits counterarguing, which causes primes to be processed more deeply and memorable than congenial primes (Marquis, 2007). In this case, priming words that are positively related to animal welfare forms uncongenial information for people with negative attitudes. Therefore, counterarguing could have been evoked which could have caused counteractive effects of priming. This could also be explained by the *Reactance Theory*, which is concerned with how people react when their freedom to choose is restricted. The theory explains how 'threatened' behaviour (e.g., eating regular food products) becomes more attractive by restriction (Lessne & Venkatesan, 1989). This would explain the significant negative effect of supraliminal priming on ethical obligation when attitudes towards animal welfare were negative.

As mentioned, another possible explanation for the lack of effects could be that people seem to have assumptions about animal friendly food products and the effects of food choice on animal-welfare. After participating in the experiment, many respondents felt the need to defend their reasoning to not purchase animal friendly food products and

expressed doubts about the positive effects of these products on animal welfare. These arguments included that they felt prices of animal friendly food products were far too high and the positive effects of product choice on animal welfare are doubtful and unclear. Interestingly, no prices were shown and no information was given about the (positive) effects of animal friendly food choice. This shows that there are preconceptions about these products which may have undermined priming effects.

Despite the fact that no main effects were found, marginal and significant moderation effects of attitudes towards animal welfare on priming effects were found. Also, descriptive statistics show positive effects of particularly the subliminal priming and the interaction condition on the dependent variables. These are interesting findings, as they raise questions on whether changes in design of the research could lead to significant effects. For instance, changing the duration of the video, the number of primes and types of primes (e.g., image primes) could be tested. These findings will be expanded upon in the section on recommendations for future research.

5.2 PRACTICAL AND THEORETICAL IMPLICATIONS

As the goal of this study was to explore whether supraliminal- and subliminal priming could be used to improve animal welfare through positively affecting food choices, it offers important findings. Based on this study, it can be concluded that presenting text primes positively related to animal welfare in a supraliminal or subliminal manner does not lead to an increase in food choice, purchase intention and feelings of ethical obligation with regards to animal friendly food products. Therefore, parties who are looking for ways to positively affect animal friendly food choice are advised to explore other approaches.

In the current study, priming effects seemed to be too weak to affect thoughts and behaviour regarding this complex ethical issue. Rather than trying to subconsciously influence people, it is recommended to study the objections against purchasing animal friendly food products more thoroughly. This knowledge could then be used to either explore other solutions for the problems at hand or to better inform people about these products if misconceptions were found.

As objections such as high prices and uncertainty regarding the effects of food choice were found, (online) supermarkets could offer more insights regarding these uncertainties. For example, when visitors of online grocery shops consider purchasing food products that are not animal friendly, alternative products could be offered. When offering these products, information could be presented on how choosing the alternative product would improve animal welfare and how much more it would cost. This would explain and justify why these products might be more expensive and it would make it easier for consumers to make well informed decisions, while taking animal welfare into account.

In physical supermarkets, information about positive effects of animal friendly food choice is very limited. As seen in this experiment, animal friendly food products mostly include a third-party logo, a sign that says 'biological' and green packaging. In supermarkets, this is practically the only information that is accessible. Therefore, people who are not familiar with what these logo's or the term biological stand for, have very limited access to information that is needed to make well informed decisions. Thus, physical supermarkets are advised to explore ways to better inform customers about these products. For example, booklets with specific product-level information on the impact of food choice could be provided near animal friendly food products, but also near products for which an animal friendly alternative is available. Information such as time an animal spends outside, how long they stay with their mother after birth and how much living space they have if people choose animal friendly products compared to regular products could be offered.

As for theoretical implications, this study contributes to the existing theoretical knowledge, due to the limited research on interaction effects of supraliminal- and subliminal priming, priming through video content and effects of priming on animal friendly food choice. Marginal and significant moderation effects of attitudes towards animal welfare on supraliminal priming effects were found. Also, when analysing the descriptive statistics, it was notable that positive priming effects on the dependent variables where found in the subliminal priming condition and the interaction condition. Especially in the interaction condition, as mean scores were the highest, except for vegetarian food choice. Based on these findings, it seems interesting to conduct future research which could expand on the current study.

5.3 LIMITATIONS

This study has several limitations that can be used as input for consecutive studies. As this study was conducted during the 'COVID-19' pandemic, practical resources were limited. Respondents participated in the experiment throughout various areas within a school building, due to which external influences could not be eliminated completely. Designated research rooms were not available due to restrictions because of the pandemic. In order to ensure reliability of the results, it is advised for future research on priming to conduct experiments in environments in which external influences can be controlled and minimized.

Another limitation in this study was the inability of using different types of priming. Using images as a different type of priming in order to test its potential effects was considered, but due to technical limitations this was not possible. Professional video editing software and a certain skill level is needed to incorporate image primes in a manner that they are not noticeable. Based on prior research, testing the effect of image primes seems interesting (Cooper & Cooper, 2002; Forwood et al., 2015: Versluis & Papies, 2016; Ohtomo, 2017; Sato et al., 2019). Thus, to further explore effects of

image priming, researchers are advised to work with professional videographers for future research.

Furthermore, respondents having to rely on assumptions and uncertainties surrounding costs and benefits of animal friendly food products is considered a limitation of this study. Respondents mentioned that these products were too expensive to even consider purchasing them, while no prices were shown. Also, doubts were expressed about the positive impact of animal friendly food choice on animal welfare. In future research, price differences could be provided, while also providing information about how food choice affects animal welfare. This would enable people to make well informed decisions, without having to rely on assumptions. Reliability would be increased, as potential effects of incorrect assumptions and uncertainties would be eliminated.

Lastly, the distribution of age within the research sample of this study was limited. The target audience of this study consisted of 18- to 34-year-old Dutch consumers. The mean age of participants was 20 years old and all participants were students. This could have affected results, as it is likely that responsibilities of purchasing and preparing food increase as people get older. Therefore, future research on this subject should ensure an even distribution of age of respondents based on its target audience.

5.4 FUTURE RESEARCH

In future studies on priming, environments in which consumers make decisions and purchase products or services could be simulated to improve validity of the research. In this study, it would have been more realistic if the experiment was conducted within an online grocery store. As mentioned, online grocery stores (e.g., ah.nl) often offer recipes and related cooking videos on their web shop, in which customers also make purchase decisions. Therefore, it seems interesting to simulate such an environment and let respondents complete a realistic decision making and purchasing process to study to what extent priming can affect food choice. Tasks could be given to watch certain videos and chose products from various categories to study potential priming effects. This could lead to practical implications that would support consumers in making decisions in line with their values and interest, such as making animal friendly food choices.

Furthermore, changes could be made in the research design of this study to test whether priming effects can be increased. As research on priming through video content is narrow, various aspects of the design at hand such as duration of the video, the number of primes and the types of primes could be adjusted. For example, using image primes instead of text primes could be tested. In this case, a two-minute cooking video was shown. In future studies, a longer video including a greater number of primes with more time in between primes could be used to test whether this strengthens priming effects.

Lastly, future researchers are advised to study the extent to which priming is a suitable option to facilitate behaviour change before conducting a study. It is also important that possible objections with regards to the subject at hand are identified. A pre-study could be conducted in order to do to so. As mentioned, in this study, priming effects could have been undermined by assumptions and uncertainties surrounding food choice. In hindsight, because of these findings, it seems unlikely that these thoughts and corresponding behaviour would be significantly affected by priming. If the researcher has comprehensive insights into thoughts, feelings and attitudes surrounding the topic of a study, the research design can be constructed accordingly. In this case, assumptions surrounding animal friendly food products could have been counteracted. This also enables the researcher to judge whether it seems plausible and interesting to study if priming could lead to significant effects.

5.5 CONCLUSION

The objective of this study was to gain insight into whether supraliminal- and subliminal priming could positively affect food choice, purchase intention and ethical obligation regarding animal friendly food products. Besides the main effects of priming, this study also investigated if an interaction effect would occur between the two types of priming and whether attitudes towards animal welfare could moderate priming effects. This study aims at increasing the understanding of how priming could be used to positively support people in making decisions that are in line with their own values and interest. The outcomes of this research show that attitudes towards animal welfare affect the effectiveness of supraliminal priming. More specifically, when people have positive attitudes towards animal welfare, supraliminal priming can significantly affect their feelings of ethical obligation regarding purchasing animal friendly food products. Interestingly, negative attitudes caused negative effects of supraliminal priming on ethical obligation.

Furthermore, no effects of supraliminal- and subliminal priming on food choice, purchase intention and ethical obligation with regards to animal friendly food products were found. The current research thus suggests that the studied types of priming are not effective in supporting consumers to make animal friendly food choices. However, when examining the descriptive statistics of the results, a promising pattern of positive effects of priming was found. Because of the marginal and significant moderation effects and the aforementioned pattern, this study offers valuable insights, implications and suggestions for future research. The findings of this study raise questions on whether priming through video content could be successfully implemented through changes in the research design. Concluding, the objective of improving animal welfare should be pursued, better educating and supporting consumers on how they can contribute to this cause. This study can be seen as another step in the right direction to discover how priming can be used for positive purposes.

REFERENCES

Bargh, J. (2002). Losing Conciousness: Automatic Influences on Consumer Judgment, Behaviour, and Motivation. *Journal of Consumer Research*, 280-285.

Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behaviour: Direct effects of trait construct and stereotype activation. *Journal of Personality and Social Psychology*, 230-244.

Beter Leven Dierenbescherming. (2020, Juni 8). *Consument let vaker op Beter Leven keurmerk*.

Cave, C. (1997). Very long-lasting priming in picture naming. *Psychological Science*, 322-325.

Cembalo, L., Caracciolo, F., Lombardi, A., Giudice, T. D., Grunert, K., & Cicia, G. (2016). Determinants of Individual Attitudes Toward Animal Welfare-Friendly Food Products. *Journal of Agricultural and Environmental Ethics*, 237–254.

Chartrand, T. L., & Bargh, J. (1996). Automatic activation of impression formation and memorization goals: Nonconscious goal priming reproduces effects of explicit task instructions. *Journal of Personality and Social Psychology*, 464-478.

Chartrand, T. L., Huber, J., Shiv, B., & Tanner, R. J. (2008). Nonconscious Goals and Consumer Choice. *Journal of Consumer Research*, 189-201.

Chartrand, T., & Bargh, J. (2000). Studying the mind in the middle: a practical guide to priming and automaticity research. *Handbook of research methods in social psychology*. New York: Cambridge University.

Cooper, J., & Cooper, G. (2002). Subliminal Motivation: A Story Revisited. *Journal of Applied Social Psychology*, 2213-2227.

Delgado, J., Johnsmeyer, B., & Balanovskiy, S. (2014, June 1). *Millennials Eat Up YouTube Food Videos*.

Elgendi, M., Kumar, P., Barbic, S., Howard, N., Abbott, D., & Cichocki, A. (2018). Subliminal Priming—State of the Art and Future Perspectives. *Behavioural sciences*, 1-23.

Forwood, S. E., Ahern, A. L., Hollands, G. J., Ng, Y.-L., & Marteau, T. M. (2015). Priming healthy eating. You can't prime all the people all of the time. *Appetite*, 93-102.

Francken, J., van Gaal, S., & de Lange, F. (2011). Immediate and long-term priming effects are independent of prime awareness. *Consciousness and Cognition*, 1793-1800.

Fukawa, N., & Niedrich, R. W. (2015). A Fluency Heuristic Account of Supraliminal Prime Effects on Product Preference. *Psychology & Marketing*, 1061-1078.

Google. (2017). *Recipe-related video watch time statistics*.

Google. (2018, June 1). *Cooking skill video watch time statistics*.

Herzog, H., Grayson, S., & McCord, D. (2015). Brief Measures of the Animal Attitude Scale. *A Multidisciplinary Journal of The Interactions of People & Animals*, 101 - 108.

Kam, C. D. (2007). Implicit Attitudes, Explicit Choices: When Subliminal Priming Predicts Candidate Preference. *Political Behavior 29(3)*, 343-367.

Krosnick, J., Betz, A., Jussim, L., & Lynn, A. (1992). Subliminal conditioning of attitudes. *Personality and Social Psychology Bulletin*, 152-162.

Légal, J.-B., Chappé, J., Coiffard, V., & Villard-Forest, A. (2011). Don't you know that you want to trust me? Subliminal goal priming and persuasion. *Journal of Experimental Social Psychology*, 358-360.

Lipsman, A. (2019, April 8). *Grocery Ecommerce 2019*.

Logatcheva, K. (2016). *Monitor Duurzaam Voedsel.* Wageningen: Wageningen University & Research.

Logatcheva, K. (2018). *Monitor Duurzaam Voedsel 2018.* Wageningen: Wageningen University & Research.

Marquis, L. (2007). Moderators of Priming Effects: A Theory and Preliminary Evidence from an Experiment on Swiss European Policy. *International Political Science Review*, 185-224.

Minas, R. K., Poor, M., Dennis, A. R., & Bartelt, V. L. (2016). A prime a day keeps calories away: The effects of supraliminal priming on food consumption and the moderating role of gender and eating restraint. *Appetite*, 494-499.

Multiscope. (2020, January 30). *3 miljoen Nederlanders gebruiken online supermarkt*.

Murphy, S., & Zajonc, R. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology*, 723-739.

Ohtomo, S. (2017). Exposure to diet priming images as cues to reduce the influence of unhealthy eating habits. *Appetite*, 83-92.

Papies, E. K., & Hamstra, P. (2010). Goal priming and eating behavior: enhancing self-regulation by environmental cues. *Health Psychology*.

Papies, E. K., & Versluis, I. (2016). Eating less from bigger packs: Preventing the pack size effect with diet primes. *Appetite*, 70-79.

Papies, E. K., Stroebe, W., & Aarts, H. (2007). Pleasure in the mind: Restrained eating and spontaneous hedonic thoughts about food. *Journal of Experimental Social Psychology*, 810-817.

Papies, E. K., Stroebe, W., & Aarts, H. (2008). The allure of forbidden food: On the role of attention in self-regulation. *Journal of Experimental Social Psychology*, 1283-1292.

Raad voor Volksgezondheid en Samenleving. (2014, January 3). *De verleiding weerstaan*.

Sato, W., Kochiyama, T., Minemoto, K., Sawada, R., & Fushiki, T. (2019). *Amygdala activation during unconscious visual processing of food.* Scientific Reports.

Sato, W., Sawada, R., Kubota, R., Toichi, Y., & Fushiki, T. (2016). *Unconscious afective responses to food.* PLoS One.

Statista. (2019, June 1). *Retail e-commerce sales worldwide from 2014 to 2023*.

Strahan, E. J., Spencer, S. J., & Zanna, M. P. (2006). Subliminal Priming and Persuasion. In F. R. Kardes, P. M. Herr, & J. Nantel, *Applying Social Cognition to Consumer-Focused Strategy* (pp. 267-280). Lawrence Erlbaum Associates.

Strahan, E., Spencer, S., & Zanna, M. (2002). Subliminal priming and persuasion: Striking while the iron is hot. *Journal of Experimental Social Psychology*, 556-568.

Strahan, E., Spencer, S., & Zanna, M. (2004). Unpublished data. University of Waterloo.

Stroebe, W., Mensink, W., Aarts, H., Schut, H., & Kruglanski, A. W. (2008). Why dieters fail: Testing the goal conflict model of eating. *Journal of Experimental Social Psychology*, 26-36.

United Nations. (2020, April 25). *SUSTAINABLE DEVELOPMENT GOAL 12*.

van den Bussche, E., Reynvoet, B., & van den Noortgate, W. (2009). Mechanisms of Masked Priming: A Meta-Analysis. *Psychological Bulletin*, 452-477.

van der Pligt, J., & Vliek, M. (2016). *The Psychology of Influence.* Taylor & Francis Ltd.

Veltkamp, M., Custers, R., & Aarts, H. (2011). Motivating consumer behavior by subliminal conditioning in the absence of basic needs: Striking even while the iron is cold. *Journal of Consumer Psychology*, 49-56.

Voedingscentrum. (2016, December 9). *Jongeren willen duurzaam eten*.

Weinberger, J., & Westen, D. (2008). RATS, We Should Have Used Clinton: Subliminal Priming in Political Campaigns. *Political Psychology*, 631-651.

Weingarten, E., Chen, Q., McAdams, M., Yi, J., Hepler, J., & Albarracin, D. (2016). From Primed Concepts to Action: A Meta-Analysis of the Behavioral Effects of Incidentally-Presented Words. *Psychol Bull*, 472–497.

Westerveld, J. (2020, April 3). *Nederland doet massaal online boodschappen: 700 man erbij voor Picnic*.

Bargh JA, Lee-Chai A, Barndollar K, Gollwitzer PM, Trotschel R. The Automated Will: Nonconscious Activation and Pursuit of Behavioral Goals. *Journal of Personality and Social Psychology. 2001; 1014–27*

Bargh, JA., Morsella, E. Unconscious Behavioral Guidance Systems. In: Agnew, C.Carlston, D.Graziano, W., Kelly, J., editors. Then a miracle occurs: Focusing on behavior in social psychological theory and research. New York: Oxford University Press; 2009

Bargh, JA. Priming Effects Replicate Just Fine, Thanks. Psychology Today. 2012

Dijksterhuis A, Aarts H. Goals, Attention, and (Un)Consciousness. Annu Rev Psychol. 2010; 61:467– 490

Hassin RR. Yes It Can: On the Functional Abilities of the Human Unconscious. Psychological Science. 2013; 195–207

APPENDIX A – CITED STUDIES

REDUCING CALORIE INTAKE

Minas et al. (2016) conducted a study focusing on the effect of supraliminal priming on food consumption with gender and eating restraint as moderating factors. 161 participants were exposed to semantic primes using healthy body image, goal-oriented words. To measure the potential effects of the primes, consumed kilocalories were counted. It was expected that participants who were primed would consume fewer calories than subjects exposed to neutral priming stimulus. Furthermore, a stronger relationship was expected for restrained eaters and females. Participants were asked to play a computer game, in which they created five-word newspaper headlines from sets of six words. One group was exposed to neutral words such as room, leaves, dwell and worker. The other group saw words such as slim, weight, healthy and fit. The results showed that the healthy body image related primes led to reduced calorie intake of females, with no effect on males. There was no significant variance between the effects for restrained and unrestrained eaters.

AMYGDALA ACTIVATION THROUGH UNCONSCIOUS PROCESSING OF FOOD

In another study, Sato et al. (2019) studied amygdala activation during unconscious visual processing of food. According to this study, emotional responses to food images are elicited rapidly, even if people are not consciously aware of the food. Although neural activity during the processing of food images was studied, the underlying neural mechanisms of unconscious food processing remained unknown. To investigate these mechanisms, neural activity was measured using functional magnetic resonance imaging while respondents viewed images of food or mosaic under both supraliminal and subliminal conditions. The participants fasted for at least three hours before partaking in the experiment and their hunger level was assessed at the beginning of the experiment.

The participants' task was to rate their preference for shown images using a nine-point scale ranging from "extremely dislike" to "extremely like". Each participant completed 48 trials, during which subliminal and supraliminal stimuli were presented in 24 trials. The food stimuli were color photographs of fast food. Three images in eight subcategories varying from hamburgers to sushi were shown. The control stimuli consisted of mosaic images which were unrecognizable as food. Subliminal stimuli were presented for 17ms, supraliminal stimuli for 1,500ms. The behavioural data of this research showed that the observation of food images in both conditions resulted in higher preference ratings than the observation of mosaic images. The findings provide significant evidence showing that observing food induces positive emotional reactions. The results of the tasks during which subliminal primes were presented did not show any significant differences between the responses to food versus mosaic images. This finding was inconsistent with the results of a previous study (Sato et al., 2016), which is believed to be caused by methodological differences. More importantly, it was found that emotional responses were more strongly

activated in response to food than mosaic images under both the subliminal and supraliminal presentation conditions. Furthermore, in the research from Sato el al. in 2016 it was found that unconscious affective reactions were elicited by the sight of food when presenting food images in the peripheral visual field for 33ms.

APPENDIX B – PRE-TEST OF PRIMING STIMULI

Q1 Beste deelnemer,

Allereerst wil ik u hartelijk danken voor uw deelname aan dit vooronderzoek.

Het doel van het onderzoek is om inzicht te krijgen in welke mate 18- tot 34-jarige Nederlandse consumenten woorden associëren met dierenwelzijn.

Het voltooien van dit onderzoek duurt ongeveer 4 minuten en is geheel anoniem. De verkregen gegevens worden uitsluitend gebruikt voor dit onderzoek. Uw deelname aan deze studie is geheel vrijwillig en u kunt zich op elk moment terugtrekken.

Mocht u vragen of opmerkingen hebben over het onderzoek, neem dan contact op via k.pegel@student.utwente.nl.

Met vriendelijke groet,

Kevin Pegel

Q2 Wat is uw leeftijd?

_____

Skip To: End of Survey If Condition: Wat is uw leeftijd? Is Greater Than 34. Skip To: End of Survey.

Skip To: End of Survey If Condition: Wat is uw leeftijd? Is Less Than 18. Skip To: End of Survey.

Q3 Woont u in Nederland?

o Ja (1)

o Nee (2)

Skip To: End of Survey If Woont u in Nederland? = Nee

Q4 Noteer vijf woorden welke u positief associeert met dierenwelzijn

o Woord 1 (1) _____

o Woord 2 (2) _____

o Woord 3 (3) _____

o Woord 4 (4) _____

o Woord 5 (5) _____

Q5 Sorteer de onderstaande woorden op basis van de mate waarin u het positief associeert met dierenwelzijn. Positie 1 is het meest positief, positie 17 het minst positief.

_____ Biologisch (1)

_____ Organisch (2)

_____ Beter Leven Keurmerk (3)

_____ Vrije uitloopeieren (4)

_____ Milieuvriendelijk (5)

_____ Duurzaam (6)

_____ Diervriendelijk (7)

_____ Klimaatvriendelijk (8)

_____ Scharrelvlees (9)

_____ Ecologisch (10)

_____ Veganistisch (11)

_____ Vegetarisch (12)

_____ Plantaardig (13)

_____ Vleesvervanger (14)

_____ Scharrelei (15)

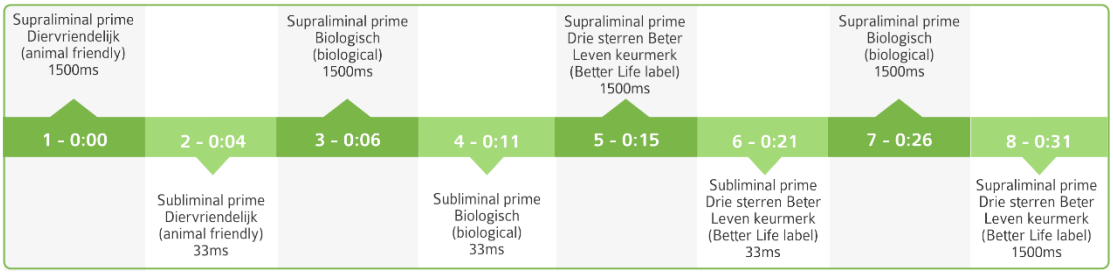
_____ Wakker Dier (16)

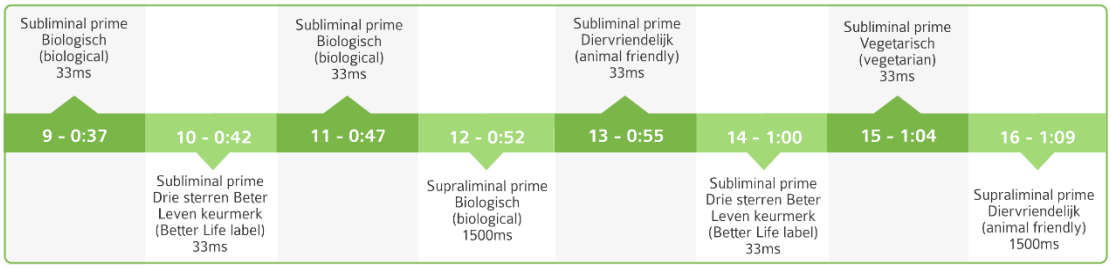
_____ Kwaliteitsvlees (17)

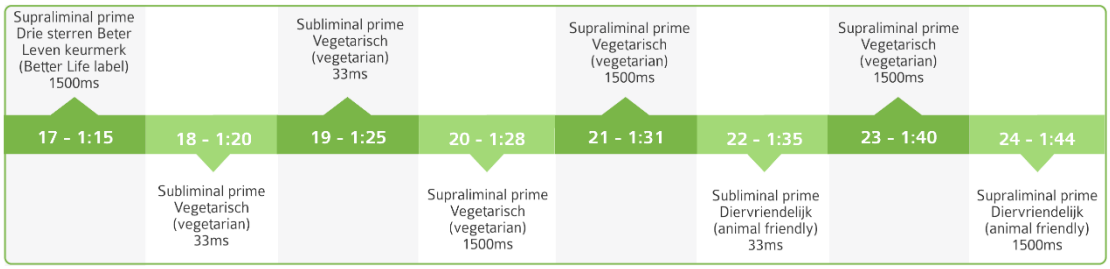
PRE-TEST RESULTS

Words	Frequency	Rankings	
Ruimte/ leefruimte/ bewegingsruimte (living space)	8	Diervriendelijk (animal friendly)	1
Zorg/verzorging (treatment)	8	Veganistisch (vegan)	2
Biologisch (biological)	6	Vegetarisch (vegetarian)	3
WWF/WNF (World Wide Fund for Nature)	4	Beter Leven Keurmerk (Better Life label)	4
Vrije uitloop … (free-range)	4	Biologisch (biological)	5
Diervriendelijk (animal friendly)	4	Wakker Dier (Dutch foundation for animal welfare)	6
Duurzaam(heid) (sustainability)	4	Milieuvriendelijk (environmentally friendly)	7
Scharrel(ei)/(kip) (barn eggs/chicken)	3	Vleesvervanger (meat substitute)	8
Liefde(vol) (lovingly)	3	Klimaatvriendelijk (climate-friendly)	9
Keurmerk(en) (quality mark)	3	Duurzaam (sustainable)	10
Groen (green)	3	Plantaardig (plant based)	11
Vegetarisch (vegetarian)	3	Organisch (organic)	12
Beter Leven (sterren) (Better Life label)	3	Scharrelei (barn eggs)	13
Natuur (nature)	2	Ecologisch (ecological)	14
Vrijheid (freedom)	2	Vrije uitloopeieren (free-range eggs)	15
Vleesvervangers (meat substitutes)	2	Scharrelvlees (free-range meat)	16
Milieubewust (environmentally conscious)	2	Kwaliteitsvlees (quality meat)	17
Boerderij (farm)	1		
Veganistisch (vegan)	1		
Plantaardig (plant-based)	1		
Klimaatvriendelijk (climate-friendly)	1		
Dierenrechten (animal rights)	1		
Dierenambulance (animal ambulance)	1		
Buiten (outside)	1		
Natuurbeheer (nature conservation)	1		
Nederland (The Netherlands)	1		
Boeren (farmers)	1		
Boerderij (farm)	1		
Levenskwaliteit (quality of life)	1		

APPENDIX C – TIMELINE OF SUBLIMINAL- AND SUPRALIMINAL PRIMES







APPENDIX D – FINAL FACTOR ANALYSIS AND ITEMS

	Factor		
Items	1	2	3
PI1 – I plan to buy animal friendly food products on a regular basis	.864		
PI2 – I plan to buy animal friendly food products	.817		
PI3 – I am willing to buy animal friendly food products from now on, instead of the food products I usually buy	.800		
PI4 – I plan to buy animal friendly food products in the near future	.784		
PI5 – My goal is to buy as many animal friendly food products as possible	.765		
PI6 - If I have the choice between buying an animal friendly and an animal-unfriendly food product, I would buy the animal friendly food product	.743		
EO1 – I think I should contribute to animal welfare		.829	
EO2 - I feel obliged to contribute to animal welfare		.802	
EO3 - In general, I think it is important that people contribute to animal welfare		.779	
ATT1 - I think that people generally have too little respect for the welfare of animals			.844
ATT2 - I think more regulation is needed for the treatment of animal husbandry			.819

Final factor analysis

	Purchase intention	Ethical obligation	Attitude
Initial Eigenvalues	6.185	1.121	1.044
Explained Variance	56.2%	10.2%	9.5%
Cronbach's Alpha	.930	.839	.721

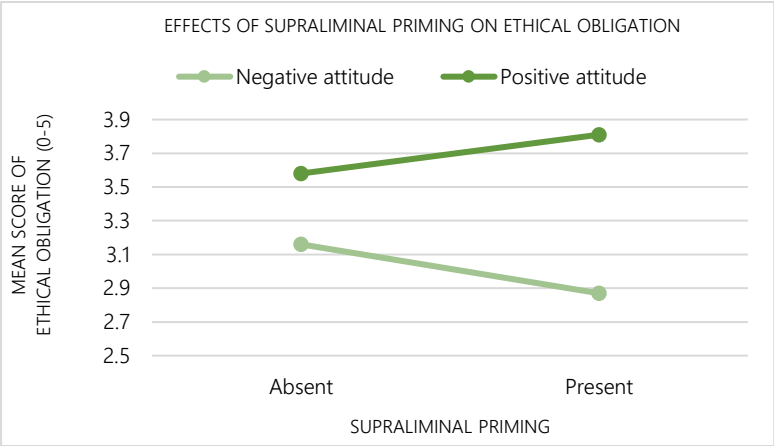
Initial Eigenvalues, Explained Variance and Cronbach's Alpha values of factors

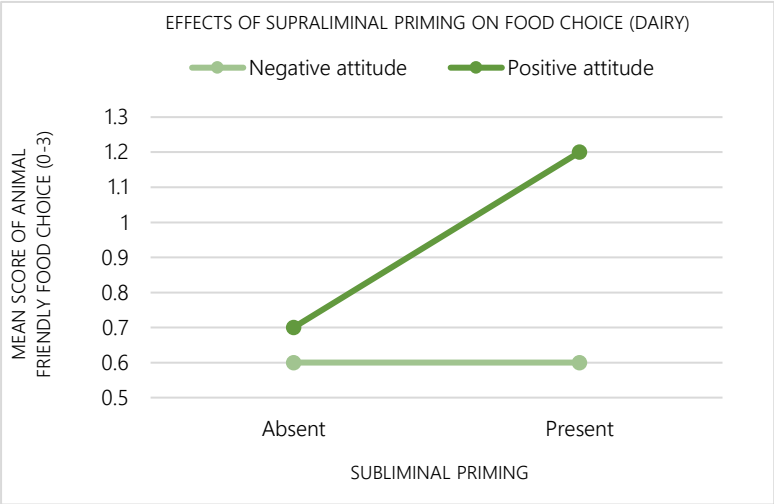
Measures	Items (Dutch)	Items (English)
Purchase intention	PI1 - Ik ben van plan regelmatig diervriendelijke voedingsproducten te kopen	I plan to buy animal friendly food products on a regular basis
	PI2 - Ik ben van plan diervriendelijke voedingsproducten te kopen	I plan to buy animal friendly food products
	PI3 - Ik ben bereid om voortaan diervriendelijke voedingsproducten te kopen, in plaats van de voedingsproducten die ik meestal koop	I am willing to buy animal friendly food products from now on, instead of the food products I usually buy
	PI4 - Ik ben van plan om in de nabije toekomst diervriendelijke voedingsproducten te kopen	I plan to buy animal friendly food products in the near future
	PI5 - Ik heb als doel zoveel mogelijk diervriendelijke voedingsproducten te kopen	My goal is to buy as many animal friendly food products as possible
	PI6 - Als ik de keuze heb tussen het kopen van een diervriendelijk en een dieronvriendelijk voedingsproduct, zou ik het diervriendelijke voedingsproduct kopen	If I have the choice between buying an animal friendly and an animal-unfriendly food product, I would buy the animal friendly food product
Ethical obligation	EO1 - Ik vind dat ik moet bijdragen aan dierenwelzijn	I think I should contribute to animal welfare
	EO2 - Ik voel me verplicht om bij te dragen aan dierenwelzijn	I feel obliged to contribute to animal welfare
	EO3 - Ik vind het over het algemeen belangrijk dat mensen bijdragen aan dierenwelzijn	In general, I think it is important that people contribute to animal welfare
Attitude towards animal welfare	ATT1 - Ik vind dat mensen over het algemeen te weinig respect hebben voor het welzijn van dieren	I think that people generally have too little respect for the welfare of animals
	ATT2 - Ik vind dat er meer regelgeving nodig is voor de behandeling van veeteelt	I think more regulation is needed for the treatment of animal husbandry

List of used items

APPENDIX E – PROFILE PLOTS

The following profile plots show effects of supraliminal priming on ethical obligation (p = 0.16) and food choice of dairy products (p = 0.183) moderated by attitudes towards animal welfare. These effects contribute the most to the marginal moderation effect of attitudes on supraliminal priming effects (p = 0.80).





APPENDIX F – EXPERIMENT AND QUESTIONNAIRE

Q1 Beste deelnemer,

Allereerst wil ik u hartelijk danken voor uw deelname aan dit onderzoek.

Het doel van het onderzoek is om inzicht te krijgen in de mate waarin 18- tot 34-jarige Nederlandse consumenten in staat zijn om de inhoud van instructievideo's te onthouden. Daarnaast wordt een aantal vragen gesteld over uw mening over bepaalde voedingsproducten.

Het voltooien van dit onderzoek duurt ongeveer 6-8 minuten en is geheel anoniem. De verkregen gegevens worden uitsluitend gebruikt voor dit onderzoek. Uw deelname aan deze studie is geheel vrijwillig en u kunt zich op elk moment terugtrekken.

Indien gewenst kunt u de resultaten van het onderzoek ontvangen. Hiervoor kunt u aan het einde van het onderzoek uw e-mailadres achterlaten.

Mocht u vragen of opmerkingen hebben over het onderzoek, neem dan contact met mij op via k.pegel@student.utwente.nl.

Nogmaals hartelijk dank voor uw deelname aan dit onderzoek.

Met vriendelijke groet,

Kevin Pegel

Q2 Ik wil deelnemen aan dit onderzoek

- ○ Ja (1)
- ○ Nee (2)
- ○

Q3 Wat is uw leeftijd?

- ○ _____

Q4 Wat is uw geslacht?

- ○ Man (1)
- ○ Vrouw (2)
- ○ Anders (3)
- ○ Ik antwoord liever niet (4)

Q5 Wat is uw hoogst voltooide opleiding (waar u ook een diploma van heeft behaald)?

- ○ Basisonderwijs (1)
- ○ Vmbo/mavo (2)
- ○ Havo/vwo (3)
- ○ Middelbaar beroepsonderwijs (mbo) (4)
- ○ Hoger beroepsonderwijs (hbo) (5)
- ○ Wetenschappelijk onderwijs (wo) (6)
- ○ Geen (7)
- ○ Anders (8) _____

Q6 - 13 Bekijk de volgende video in volledig scherm, zonder pauzeren en terugspoelen. U kunt verder naar de volgende vraag zodra de video is afgelopen.

Q14 Welke ingrediënten werden gebruikt voor het eerste recept "babi ketjap"?

- [ ] Runderlappen (1)
- [ ] Witte rijst (2)
- [ ] Rode peper (3)
- [ ] Teriyaki saus (4)
- [ ] Knoflook (5)
- [ ] Spitskool (6)
- [ ] Gember (7)

Q15 Welke ingrediënten werden gebruikt voor het tweede recept "eendenborst" ?

- [ ] Kerrie (1)
- [ ] Pastinaak (2)
- [ ] Olijfolie (3)
- [ ] Citroen (4)
- [ ] Roomboter (5)
- [ ] Rozenharissa (6)
- [ ] Baharat (7)
- [ ] Wortel (8)

Q16 Welke ingrediënten werden gebruikt voor het derde recept "burger" ?

- [ ] Hamburger (1)
- [ ] Augurk (2)
- [ ] Ceasardressing (3)
- [ ] Romainesla (4)
- [ ] Trostomaten (5)
- [ ] Komkommer (6)
- [ ] Hamburgerbroodjes (7)
- [ ] Ui (8)

Q17 In het volgende deel van het onderzoek wordt gevraagd een keuze te maken tussen producten voor het bereiden van een gerecht.

Q18 Welke van de onderstaande producten zou u gebruiken om 'kipsaté' te bereiden?

Q19 Welke van de onderstaande producten zou u gebruiken om 'spaghetti bolognese' te bereiden?

Q20 Welke van de onderstaande producten zou u gebruiken om een 'hamburger' te bereiden?

Q21 Welke van de onderstaande producten zou u gebruiken om 'yoghurtdip' te bereiden?

Q22 Welke van de onderstaande producten zou u gebruiken om 'cheesecake' te bereiden?

Q23 Welke van de onderstaande producten zou u gebruiken om een 'milkshake' te bereiden?

Q24 Welke van de onderstaande producten zou u gebruiken om 'borrelhapjes' te bereiden?

Q25 Welke van de onderstaande producten zou u gebruiken om een 'broodje shoarma' te bereiden?

Q26 Welke van de onderstaande producten zou u gebruiken om 'barbecue worstjes' te bereiden?

○

○

Q27 Geef aan in welke mate u het eens of oneens bent met de volgende uitspraken

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Het is belangrijk dat het voedsel dat ik normaal eet, is geproduceerd op een manier waarbij dieren geen pijn hebben ervaren (1)	○	○	○	○	○
Het is belangrijk dat het voedsel dat ik normaal eet, is geproduceerd op een manier waarbij de rechten van dieren zijn gerespecteerd (2)	○	○	○	○	○
Ik vind het acceptabel dat dieren worden grootgebracht voor menselijke consumptie (3)	○	○	○	○	○
Ik vind het acceptabel dat dieren worden gebruikt voor menselijke consumptie, zolang ze geen pijn lijden (4)	○	○	○	○	○
Ik vind het acceptabel dat dieren weinig leefruimte hebben voor de productie van goedkope eieren, vlees- en zuivelproducten (5)	○	○	○	○	○
Ik vind dat er meer regelgeving nodig is voor de behandeling van veeteelt (6)	○	○	○	○	○
Ik vind dat mensen over het algemeen te weinig respect hebben voor het welzijn van dieren (7)	○	○	○	○	○

Q28 Geef aan in welke mate u het eens of oneens bent met de volgende uitspraken

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Ik voel me verplicht om diervriendelijke voedingsproducten te kopen (1)	○	○	○	○	○
Ik voel me schuldig als ik een 'normaal' voedingsproduct koop in plaats van een diervriendelijk alternatief (2)	○	○	○	○	○
Ik voel me verplicht om bij te dragen aan dierenwelzijn (3)	○	○	○	○	○
Ik vind dat ik moet bijdragen aan dierenwelzijn (4)	○	○	○	○	○
Ik vind het over het algemeen belangrijk dat mensen bijdragen aan dierenwelzijn (5)	○	○	○	○	○
Het zou tegen mijn waarden en principes zijn als ik dieronvriendelijke voedingsproducten koop (6)	○	○	○	○	○
Door mijn eigen waarden en principes voel ik me verplicht om diervriendelijke voedingsproducten te kopen (7)	○	○	○	○	○
Door mijn eigen waarden en principes voel ik me verplicht om diervriendelijke voedingsproducten te kopen, ongeacht welke producten andere mensen kopen (8)	○	○	○	○	○

Q29 Geef aan in welke mate u het eens of oneens bent met de volgende uitspraken

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Ik ben van plan diervriendelijke voedingsproducten te kopen (1)	○	○	○	○	○
Ik ben van plan om in de nabije toekomst diervriendelijke voedingsproducten te kopen (2)	○	○	○	○	○
Ik ben van plan regelmatig diervriendelijke voedingsproducten te kopen (3)	○	○	○	○	○
Ik heb als doel zoveel mogelijk diervriendelijke voedingsproducten te kopen (4)	○	○	○	○	○
Ik ben bereid om voortaan diervriendelijke voedingsproducten te kopen, in plaats van de voedingsproducten die ik meestal koop (5)	○	○	○	○	○
Als ik de keuze heb tussen het kopen van een diervriendelijk en een dieronvriendelijk voedingsproduct, zou ik het diervriendelijke voedingsproduct kopen (6)	○	○	○	○	○

Q30 Geef aan in welke mate u het eens of oneens bent met de volgende uitspraken

	Zeer mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Zeer mee eens (5)
Ik ben geïnteresseerd in koken (1)	○	○	○	○	○
Ik ben geïnteresseerd in kookvideo's (2)	○	○	○	○	○
Ik ben geïnteresseerd in recepten (3)	○	○	○	○	○

Q31 Hoe vaak bereidt u gemiddeld per week uw avondeten?

- ○ Niet (1)
- ○ 1 keer (2)
- ○ 2 keer (3)
- ○ 3 keer (4)
- ○ 4 keer (5)
- ○ 5 keer (6)
- ○ 6 keer (7)
- ○ 7 keer (8)

Q32 Indien u de resultaten van het onderzoek zou willen ontvangen kunt u in het onderstaande veld uw e-mailadres achterlaten

_____

Q33 Indien u verdere opmerkingen of vragen heeft met betrekking tot dit onderzoek, kunt u deze aangeven in het onderstaande veld

_____

_____

_____