Exploring Consumers' Acceptance Towards Different Framing Of In-vitro meat In The Netherlands.

Bachelors thesis Marketing and Consumer Behaviour

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Abstract

In-vitro meat (IVM) is expected to become a promising development for the rising quest of high-quality protein sources. With the in-vitro meat development reaching commercial availability it is important to ensure that this novel (technological) development will be in line with consumer preferences, to ensure its commercial success. However, consumer acceptance towards in-vitro meat is still unclear. One of the reasons could be due to the way in-vitro meat is framed. The purpose of this study was to investigate what the influence of framing is on perceived naturalness, attitude and behavioural intention to try in-vitro meat in the Netherlands. A between-subject design was conducted with two conditions: animal-free meat vs. laboratory meat. Dutch participants (N=165) were allocated in one of the two conditions and filled out an online questionnaire. Results showed that framing did have a direct effect on consumers behavioural intention to try in-vitro meat. However, the results did not confirm that animal-free meat would lead to a higher perceived naturalness than laboratory meat. Mediation analysis did not show that valence of attitude influenced the perceived naturalness on the behavioural intention to try in-vitro meat. The lack of perceived naturalness of in-vitro meat seems to be a reason for respondents perceived lower attitude and behavioural intention to try in-vitro meat. Also, moderating analysis did not show a significant effect that subjective knowledge would moderate the perceived naturalness for each frame. The results of this study indicate that the influence of framing on behavioural intention towards in-vitro meat is present, however this cannot be allocated to the perceived naturalness of the framing.

Keywords: in vitro fertilized meat, consumer acceptance, behavioural intention, framing, attitude.

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1. Introduction

During the summer of 2012 the first meat grown in a laboratory was developed by Post (Post, 2012; mosameat, 2019). In-vitro meat (IVM), also known under the more commercial name of cultured meat, is the development of meat grown outside the animal body. Stem cells from animals are extracted and cultivated allowing to cultivate just as they would in an animal. The cells develop a network that creates the beginning of muscle tissue. When all these strands come together the known meat structure is formed, allowing for multiple applicational uses of conventional meat products (mosameat, 2019).

Environmental issues, health related problems and a increasing demand for (animal) proteins, due to the growing world population, have fuelled the demand for high quality proteins at lower environmental cost (Post, 2012; mosameat, 2019; Steinfeld et al. 2006). This is mainly due to the rising middle class of low-income countries such as China, India and Russia (FAO, 2011, FAO, 2018). In order to regulate this balance different sources for animal proteins are being explored. Alternative sources can be found in the growth of plant-based alternatives such as pulses, soy and seaweed or alternative animal proteins, being farmed fish and insects (Joshi & Kumar, 2015; Post, 2014). However, the transition from a meat-based diet to plant-based diet will in all likelihood not significantly contribute to the reduction of the meat demand (Post, 2014; de Bakker & Dagevos, 2012). Reasons for this stagnation are amongst others: the western meat culture, the growth of meat as a Gross Domestic Product in low income countries and the slow transition from a meat-based diet to a plant-based diet (FAO, 2018; Cassiday, 2018; de Bakker & Dagevos, 2012). IVM is expected to be a prominent development to combat protein shortage in the near future and is assumed to be more environmentally friendly, more food safe and animal friendlier than conventional meat (Bonny, Gardner, Pethick, Hocquette, 2015; Tuomisto & Teixeira de Mattos, 2014).

As the development of IVM is reaching commercial availability consumer insight is important to ensure that this novel (technological) development will be in line with the consumer preferences, to ensure its commercial success. However, mixed findings are creating an unsure environment on the research of consumers acceptance towards IVM. For example, a study conducted by Post (2014) researched the consumer acceptance of IVM amongst consumers in the Netherlands found that consumers were in favour for the concept of IVM and were willing to try IVM if it would be available. Similarly, Wilks and Phillips (2017) studied consumer acceptance towards IVM in the United states and found comparable results. Their finding suggested that the general perception towards IVM was more positive than initiated. This is in contrast to a study conducted by Verbeke, Marcu, Rutsaert, Gaspar, Fletcher & Barnett (2015) who reported feelings of disgust and concerns of unnaturalness related to IVM. Moreover, Verbeke et. al. (2015) showed that the direct affects evoked feelings

of disgust and concerns on the perceived risk towards the healthiness of IVM. Similar concerns were found in a research by Hocquette (2016) who found that consumers express the artificial nature of the IVM was in contrast to the growing demand for natural products.

Thus, the main concerns of consumers towards IVM are related to perceived (un)naturalness, food safety and the regulation issues (Verbeke, et. al., 2015; Hocquette, 2016; Wilks and Phillips, 2017). The continuous technological development of IVM does not make it easy to get a full understanding of its impact and the challenges. Different factors such as; the context in which IVM is being researched, the time release of the papers and the different countries in which the studies were researched could have been of influence on the result and have led to different findings of how IVM is perceived and accepted in these articles.

Previous research (e.g. Wilks & Phillips, 2017; Hocquette, 2016; Verbeke et al. 2015; Post, 2014) has shown that consumers have different associations and ideas about IVM. Since associative networks of events, idea's and meanings influencing consumers' perception, it can be argued that naming (e.g. framing) has a large influence on the association's consumers form about a new product (Levin, 1987). The importance of framing for IVM technology has also been substantiated by Friedrich (2016) and Szejda of the Good Food Institute (2018). From their studies we have learned that consumers have mixed feelings for frames such as cultured meat, in-vitro meat or clean meat. Recently, also a study of IVM framing was performed by Bryant and Barnett (2019). Their study showed that framing of IVM, e.g. cultured meat, clean meat, lab-grown meat or animal-free meat, indeed were of significance effect on the consumer acceptance towards IVM. Participants were more acceptable of natural sounding names such as clean meat in comparison to unnatural sounding names of cultured meat. Bryant and Barnett (2019) stated that the results were only applicable to the English market and future research should focus on the nomenclature in different languages.

Therefore, this study will contribute to current literature by investigating what the effect of the Dutch names "laboratory meat" and "animal-free meat" used to refer to IVM are on the Dutch consumer acceptance and behavioural intention to trying IVM. 'Framing' studies in relation to IVM have not yet been researched in The Netherlands. Secondly, IVM framing in relation to 'naturalness association', 'attitude' and 'behavioural intention' to buy have not been researched within this context.

Within the Dutch media various names have been referred to for IVM, such as: cultured meat, laboratory meat, in-vitro meat and animal-free meat (In Dutch: kweekvlees, laboratorium vlees, kunstmatig vlees and dier-vrij vlees) (VPRO, 2018; Mulder, 2013; Boon, 2010; Wikipedia, 2019). It is suggested that the consumer acceptance and behavioural intention towards IVM will be positive or negative dependent on the suggested naturalness association individuals have with IVM. Also, it is assumed that the naturalness associations are moderated

via the individual's subjective knowledge. Therefore, the research question that will be answered in this study is:

What is the influence of names "laboratory meat" and "animal-free meat" used to refer to IVM on the Dutch consumer attitude and behavioural intention to try In-vitro meat in the Netherlands and is this moderated by subjective knowledge?

This research can contribute to the overall knowledge on how IVM should be introduced within the Dutch market. It could help marketers understand how the different naming influences consumer attitude and behavioural intention to try IVM.

2. Theoretical framework

Within the following theoretical framework several concepts of framing on behavioural intention to try IVM are discussed. First, the consumers decision making process is discussed via the concepts: heuristics and biases and how it influences the attitude. Secondly, the influence of framing on IVM is explained. The third part of the theoretical framework explains how naturalness is associated with IVM. Lastly, subjective knowledge as a moderator is examined.

2.1. Information processing

Making decisions on whether or not to buy something and the attitude one has towards an object is based on the judgement and evaluation one makes (Karimi, Papaichail, Holland 2015). This information processing is happening inside the brain where decisions go through several steps in order form a conclusion. First, when cues in the environment are paid attention to by the working memory, information is brought in via the senses and processed via a number of processing systems (e.g. attention and perception) (Wallace, Ross & Davies, 2003). This received information can be processed in two ways; called the dual processing theory. The dual processing theory suggest that the brain consists of 2 systems of thinking; system 1 and system 2. System 1 (intuition) involves automatic processes that we have little control over. It is heuristic in nature and involves the ideas we have based on previous examples, associations and relies on mental “shortcuts”. System 2 (reason) is responsible for effortful mental activities that demand complex compilations. It is associated with choice and believes we have (Kahneman, 2011). The dual process models can help give an understanding on how consumers attitude and behavioural intention is formed. As mentioned in the introduction, different findings of behavioural intention towards IVM are given. Verbeke, Marcu, et. Al. (2015) find negative relations of IVM related to initial reactions, such as disgust (system 1) and further reflections, being health and naturalness concerns (system 2).

Therefore, this research suggests that individuals when confronted with IVM frame name and concept will use system 1 thinking where their initial reactions will be affective reactions. Individuals will use heuristics biases from the available information and associations they have in the moment of decision making. While the initial reactions are direct affective reactions further reflection of the new technology will be conscious evaluation of the technology as a food option, thus system 2 thinking. First system 1 will occur where associations with the product will serve as a basis for system 2. System 2 will monitor System 1 response by evaluating the intuitive response before a decision is made deliberately (Dhar & Gorlin, 2013).

Based on the available information from the environment and the readily available knowledge they have from their semantic memory, individuals will make an inference about

how they perceive the product (Wallace, Ross & Davies, 2003). Inferences are made based upon similarity of the object's attributes and the defined category it relates to. With the association and categorization that is happening in the brain one is able to make a judgement about the object or event. After the judgement individuals engage in attitude formation (Wyer & Carlon, 1979). Dependent on whether or not the inferences are perceived as positive or negative will influence the attitude around the object (Katz, 1960).

2.1.1 Direct affect.

Instead of going through the whole decision-making process when evaluating a product individual can use a mental shortcut to evaluate the risk and benefit of an object and make a judgement on the spot. These shortcuts are called heuristic process (Finucane, Alhakami, Slovic and Johnson, 2000). A heuristic is a short-cut information processing strategy to make decisions less effortful. Heuristics can therefore be used as a way to examine information and make inferences (Kahneman & Frederick, 2002).

Affect heuristics is a heuristic that can be used when a situation askes more complex evaluations in the decision-making process (Kahneman & Fredericks, 2002). Affects are quick (good or bad) emotional responses to a stimulus, where a mental shortcut is made when making automatic decision. With affect heuristics an individual relies heavily upon their emotional state during the decision making, rather than taking the time to consider long-term consequences of a decision. Affects can be positive or negative, which influences an individual's perception of the benefits and risks of an object or stimulus. They are fast, automatic and often based on experiences and are an example of the dual system thinking of system one; where we rely on quick, emotional shortcuts rather than well thought rational evaluations. Affects can serve as a cue for making judgements by using availability (e.g. the readily available information they have) and representativeness (e.g. the here and now rather than weighing pros and cons or retrieving previous information) (Finucane, Alhakami, Slovic and Johnson, 2000).

Even though, heuristics are a quick way to help in the decision-making process they can also lead to bias. These biases arise when the object is less clear than those who are nearer (Kahneman & Frederick, 2002). This means that concepts, where consumers have more previous experience or associative networks off, will be perceived as nearer and therefore be less prone to bias than objects or events that are new. It is presumed that this is the case with IVM, since it is yet to be come mainstream on the market and

2.1.2 Attitude formation

The (affect) heuristic influences the attitude formation in a such a way that an affect can create a bias (either positive or negative) that influences the attitude towards a product, thereby

influencing consumers' willingness to try (Bekker, Fischer, Toib and van Trijp, 2017). These heuristics, inferences and biases of the frame lead then to specific evaluations and believes, or in other words, the attitude. Attitudes are objective evaluations of associations of an object based on certain behavioural believes (Gawronski, 2007; Azjen 2001). These evaluations can be stored in the memory or be elaborated upon from previous relevant information. Stored evaluations are often done via system one; automatic and without reasoning and form implicit attitudes.

If the un-familiar product will evoke associations of for example, unnaturalness a negative response will be expected (Bekker, et al., 2017). Where a positive attitude creates positive strategy for an object and a negative attitude creates a negative response (Pratkanis, 1998). Since affects are emotion based and are of influence on the perceived risk and benefits the assumption lies that Animal-free meat will create a more attitude than laboratory-meat. This research presumes that animal-free is often more associated with positive feelings and therefore, create heuristics that are more positive loaded. One way these positive evaluations can be influenced is in the way the product will be framed (Takemura, 2014).

2.2 The influence of framing on associations of IVM

One way how a bias can be formed is via framing. Framing is the evaluation and perception an individual has of a certain object. Frames are abstractions that help organize or structure the meaning of a message one perceives it to be. It is based on a decision problem of one's act, outcome and contingencies that are associated with the problem and different perspectives that can be construed from it (Tversky & Kahneman, 1981).

A distinction can be made between two kinds of frames; the communication frame and the individual's frame. The communication frame is the frame that is used by the communicators to highlight a word, image or phrase (Gamson and Modigliani, 1989). The latter is the process by which people's choices are dependent on how something is shown to the audience (the frame) and how this information is be processed (Chong & Druckman, 2007). Both are of importance for this study as they give an understanding on how the choice of communication of the different frames (i.e. communication frame) influences on how the receiver perceives it (i.e. the individuals frame).

Within the realm of communication, framing can help as a persuasion technique by choosing specific words or techniques to make the viewer more susceptible towards an object (de Bruijn, 2014). An example is the way the food industry uses words on their products to frame it in such a way that it elicits a certain (positive) association. Words such as healthy, natural, fresh, etc. are positively loaded that bring a certain association with them (Spence & Piqueras-Fiszman, 2014, pp. 71-107).

Several studies have shown that the use of alternative words can influence the meaning to the receiver. For example, recently, a study on the influence of framing on genetic modification showed that the way genetic modification is defined, either as Genetical engineering (GE), genetic modification (GM), or agricultural biotechnology (Agbiotech), has an influence on how consumers perceive specific GE-related terms (Zahry & Besley, 2019). Zahry and Besley (2019) conducted a research to compare the effects of the different terms on the consumers' cognitive, affective and behavioural attitude towards GE-related terms. They conducted 2 studies where they examined whether the choice of GE vs. GM (study 1), as well as GE vs. GM vs. Agbiotech (study 2) would result in different responses towards the food technology in terms of the way whom it was written from (source; either government, consumer organization, newspaper or no source). Most importantly their study showed that framing is of importance on consumers perception towards GM where GE was associated with higher benefits than GM framing.

This study will focus on valence framing where a frame with the same kind of information is shown in two different ways; one frame is positive, and the other one is negative (Levin, Schneider & Gaeth, 1998; Kahneman & Tversky, 1979). This research presumes that valence framing can help understand how individuals code information and form biases dependent on the way it is framed. In this research the name (attribute) is studied where it assumes that animal-free meat will be perceived as a positive term and laboratory meat as the negative term, both implying different levels of attraction. In this context this study assumes that respondents will have the tendency to make more positive evaluations and associations when the item is framed positively. This is due to the idea that the mere presence of positive associations in the memory from one item can lead to positive biases of the object (Levin, Schneider and Gaeth, 1998; Gambara and Pinon, 2005).

2.3 Psychological mechanisms that influence behavioural intention

2.3.1 Perceived naturalness

Several explanations can be allocated to how framing effects occur. One of the suggested effects is the influence of the associative account. Associations are formed based on a person's (previous) experiences and are stored in a network that combines different experiences into one similar category (Teichert & Schöntag, 2010).

Previous systematic research towards consumer acceptance found that IVM evokes concerns related to food safety, technological advancement, regulation, naturalness and healthiness (Bryant and Barnett, 2018). Complementary, research conducted by the research agency Flycathers in the Netherlands showed similar results. Flycatcher showed that over the last five years Dutch consumers have become more positive towards IVM. However, prominent

barriers were amongst others the association with unhealthiness and unnaturalness (Flycatchers, 2018).

In general, perceived naturalness is one of the most important subjects for consumers acceptance towards (novel) food and food technologies (Rozin, Fischler, Imada, Sarubin & Wrzesniewski, 1999; Laestadius & Caldwell, 2015; Petetin, 2014). This is due to the fact that consumers use perceived naturalness as a heuristic attribute and indicator for the perceived food quality (Rozin, et. al., 1999). Recently, Román, Sanchez-Siles and Siegrist (2017) conducted a systematic review of 72 studies involving over 85.000 customers. Román, et. al (2017) systematic review revealed that across countries and years naturalness in food products is crucial indicator for consumers perceived food quality and behavioural intention to try new products. Later, their review led to the development of the Food Naturalness Index (FNI). The FNI is an objective index to measure the degree of naturalness from a consumer's perspective (Sanchez-Siles, Michel, Roman, Bernal, Phillipsen, Haro, Siegrist, 2019).

Especially, with regards to the perception of IVM, unnaturalness is one of highest noted associations and concerns on consumers' willingness to try new products (Verbeke, et. al., 2015; Wilks & Phillips, 2017; Marcu et. al, 2015). This is generally suggested for gene technology where IVM is based on. Given the fact that naturalness is of high importance and the fact that gene technology is perceived as unnatural it may therefore be difficult to create a positive bias and acceptance towards IVM. Several studies conducted by Rozin, Spranca, Krieger, Neuhaus, Surillo, Swerdlin & Wood (2004) and Rozin (2005) suggests that the judgement of naturalness is more influenced by the process of the food product than by its content. In other words, how the food is produced may therefore be of more importance than its content. Secondly, similar research on Gene technology, regarding Genital modification, has shown that GM evokes a negative affect if the technology that is used to create the organisms could also be produced by natural breeding techniques (Kronberger, Wagner, & Nagata, 2014).

This research, therefore, suggest that the acceptance of IVM is strongly influenced by how natural the IVM frame is perceived. If the concept is framed in a more natural construct e.g. animal-free, this research suggests that individuals will perceive the product as more favourable than when a frame illicit unnatural and synthetic associations e.g. laboratory meat. Therefore, consumers will most likely tend to favour the animal-free frame if it is regarded as more natural compared to laboratory meat.

2.3.2 Subjective technology knowledge

Consumers information processing is affected by the knowledge a consumer has about the product. Early research on knowledge goes back to Brucks (1985) who made a distinction between three categories of consumer knowledge relevant to consumer behaviour: (1)

subjective knowledge, (2) objective knowledge, and (3) prior experience. Specifically, this research will focus on subjective knowledge as an influence on the decision-making process, since the product is not yet available on the market. Subjective knowledge or self-perceived knowledge is the perceived knowledge one thinks he or she has. Together with the objective knowledge, the knowledge one actually has, forms the experience one has with a product, which in turn influences the consumer behaviour (Flynn & Goldsmith, 1999). Subjective knowledge in comparison to objective knowledge has a higher measuring reliability (Phillips, Asperin and Wolfe, 2013), is strongly related to decision making and is a higher predictor for purchase intention (Flynn & Goldsmith, 1999). Several studies have identified knowledge as a possible determinant for the attitude formation towards new food technologies (Christoph, Bruhn, Roosen, 2007; Zhu and Xie, 2015; Klerk and Sweeny, 2007).A similar study researching the influence of objective and subjective knowledge on the influence of consumer behaviour showed that both objective as well as subjective knowledge are important determinants for the support of GM technology. The more informed the respondent was the more likely they would be supportive of the technology (Ganiere, Chern and Hahn, 2006)

Consumers subjective knowledge is mainly influenced subjective media coverage in the western society. Hopkins (2015) reviewed the media coverage of cultured meat in western media are mainly focussing on the taste and potential (environmental) benefits of cultured meat when fully developed. Since subjective knowledge influences consumer attitude and people are yet often mainly exposed to media coverage but cannot follow up by hands-on product experience with IVM this will moderate their judgement, which in turn increases their perception and should enhance or reduce their reaction (Loebnitz & Grunert, 2018).

This research therefore expects that dependent on the previous knowledge and associations consumers have will influence how they will perceive a certain object. The level of subjective knowledge will moderate one's reaction towards the frame and influences the perceived naturalness (Zhu and Xie, 2015).

2.4 Hypotheses and conceptual model

Based on the above-mentioned literature, the following conceptual model (Figure 1) was created to visualize the pathways of the influence of framing on the behavioural intention to try IVM. Below, the five hypotheses, that logically follow from the theoretical framework, are summarized.

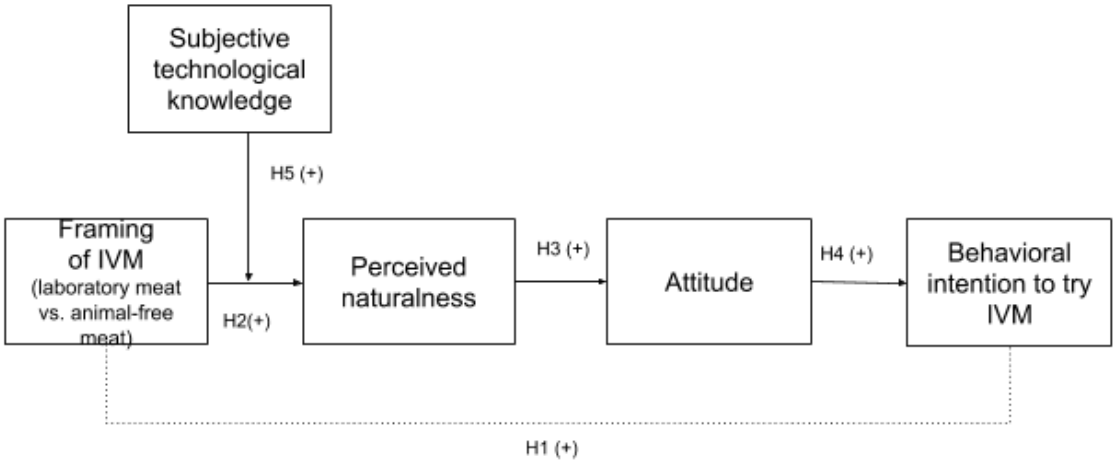

Figure 1: Schematic representation of the conceptual model.

At the basis of the theoretical framework of this research, the way IVM is framed (either positive or negative) places an important role in the decision-making process. Generally, it is assumed that a frame with a positive affect leads to an overall more positive experience thereby influencing the direct effect on a consumer's behavioural intention to try IVM. For example, Levin et. al. (1988) found that alternative framing of information in either positive or negative way affects judgement and decisions and thereby the decision-making process.

H1: Compared to the frame "laboratory meat", the frame "animal-free meat" will directly lead to a positive behavioural intention to try IVM

Similarly, the positive frame (e.g. animal-free meat) is presumed to lead to a more favourable perceived naturalness, since naturalness is of great importance on consumers' willingness to try new foods (Roman, et. al. 2017). The associations of the frame will be dependent on the perceived naturalness one has with the frame. Rozin et. al. (2004) found that consumers judge the naturalness of a product more on the process it elicits than by its content.

H2: Compared to the frame "laboratory meat", the frame of "animal free" meat will lead to more positive perceived naturalness associations.

Next, it is assumed that the evaluation of a positive perceived naturalness increases the chance of a positive attitude towards IVM, and vice versa. Perceived naturalness is therefore presumed to initiated certain associations with the frame that creates a certain attitude towards IVM. Since, attitude can serve as a heuristic for making inferences it is expected that if an un-familiar product evokes associations of naturalness a positive response is to be expected (Bekker, et. al., 2017).

H3: The higher the perceived naturalness of the frame, the higher chance of a positive attitude towards IVM.

Subsequently, following the attitude formation, it is expected that an overall positive evaluation of the available information and thereby the attitude increase the likelihood for the behavioural intention to try IVM. As an overall positive evaluation will lead to a higher chance of the acceptance of the behaviour. Concludingly, a positive perceived attitude is thus assumed to increase the behavioural intention.

H4: A higher positive attitude will lead to a higher behavioural intention to try IVM.

Since, IVM is not yet commercially available consumers will have to make judgements based on the associations and knowledge they have encountered it is suggested that the interaction of subjective knowledge about the food product should enhance (in case of low subjective knowledge or reduce (in case of high subjective knowledge) consumers response to the frame condition of IVM (Garniere, et. al. 2006).

H5: Individuals with a lower subjective technology knowledge will respond more strongly to the frame "laboratory meat" than people who have higher subjective technology knowledge of IVM.

3. Method

3.1 Design

This experimental study was conducted at the Wageningen University & Research (WUR). For this experiment a between subject design was carried out in which one factor was manipulated: the frame of the meat with two levels: laboratorial meat versus animal-free meat. The decision to frame IVM with these two frames was partly based on an analysis of the most used names in the Dutch media (see table 1). A deliberate choice was made not to choose for the Dutch term of cultured meat as one of the conditions. The possibility was present that the term cultured meat would be too much known amongst the Dutch respondents and a bias could have already been formed, which could jeopardize the internal validity of the study. The two chosen frames were conceptually distinct from each other where animal-free meat could have been seen as positive feature and laboratory meat as negative. Also, since both frames are not much used within the Dutch media the assumption is that both frames will have a similar baseline and no significant difference in previous knowledge will be found between them. Participants were randomly allocated to one of the two conditions. For both conditions, the outcome variable was behavioural intention to try. Independent of their objective knowledge and prior to the main questions, participants were given a short description of the product and its technological implications, as stated below. The description below has been sought to be as neutral as possible, whereby bias forming was as little as possible.

[frame name]

Is developed from animal stem cells that grow outside the animal, without the use of a living being. This product has been developed for human consumption as an alternative to traditional meat products. The product is not yet on the market, but technologies to develop it are up and running.

Table 1: Overview Dutch variants for IVM mentioned in the Dutch media.

Name	**Source**
Kweekvlees	Mulder, 2013
Kunst(matig) vlees	Vlees.nl, 2019
In-vitro vlees	Wikipedia, 2019
Laboratorium vlees	Vlees.nl, 2019
Dier-vrij vlees	Vlees.nl, 2019
Nepvlees	Vlees.nl, 2019
Namaak vlees	Vlees.nl, 2019
Clean meat	Idzikowska, 2018

3.2 Participants

This study was conducted mainly amongst students of the Wageningen University, however other participants were enlisted via the professional and personal network of the researcher. Participants were reached via different channels: Facebook and Instagram. Secondly, two days in week 49 and 50 of 2019 a lecture room was reserved where respondents could come to fill in the survey for a small snack. Thirdly, participation flyer with the survey link were scattered throughout the Forum building on the WUR campus. The only screening criteria was that respondents should be fluent in the Dutch language.

Combined in total 36 respondents were deleted, leaving 165 suitable respondents for the data analysis. Among the respondents 72,1% were female (119) and 27,9% male (46), divided over the two conditions.

3.3 Measures

This research was conducted using a quantitative survey where the below mentioned construct were measured. In the appendix 1 an overview of the questionnaire can be found.

3.3.1 Dependent variable

Behavioural intention was the dependent variable. Behavioural intention to try IVM was defined within this research as the intention to try the product or buy the product in the near future. Behavioural intention was measured using a 3-item scale adapted from Wilks and Phillips (2017) five-item behavioural intention scale. Research conducted by Weinrich, Stack and Neugebauer (2019) showed similar significant results when using Wilks and Phillips (2017) behavioural intention scale. Participants had to state to what extent they would be willing to agree or disagree with the following statements: (1) “I am willing to try this product ”, (2) “I am willing to try this food if the product is better compared to traditional meat”, (3) “I am willing to buy this product if it is cheaper than traditional meat”. The items were measured using a five-point Likert scale ranging from 1 = I strongly disagree to 5 = I strongly agree.

Scale reliability was measured using Cronbach’s alpha. Cronbach’s alpha showed an acceptable alpha of 0.866, well above the minimum alpha 0.7.

3.3.2 Mediating variables

Perceived naturalness

The perceived naturalness was measured using naturalness association from the Food Naturalness Index (Sanchez-Siles, Michel, Román, Bernal, Phillipsen, Haro and Siegrist, 2019). In total nine-item, see table 2, adjusted from the ten-items scale were used. There have yet to be other studies using this measurement index, since the paper has only been released

in September 2019. However, a previous research where this index was built on from Roman, Sanchez-Siles and Siegrist (2017) performed an extensive review on the importance of naturalness and its influence on consumer acceptance.

All items were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5= strongly agree. Cronbach's alpha was calculated at 0.626 for nine items. This is a problem since the minimum bar should be above 0.7, therefore a correction in the data had to be made. According to the SPSS output item nr. (9) had a negative inter-item covariance with the other items. By deleting item nr. 9 the scale reliability went up to a Cronbach's Alpha of 0.655. Deleting other items would not lead to a significant higher overall alpha. Secondly, Field (2013) suggested that the rule of thumb for a plausible alpha is dependent on the nature of the construct. Psychological constructs, such as this one, can therefore foster a construct from even below 0.7 this is due to the diversity of the constructs being measured. Therefore, this research continued with the given Cronbach's alpha 0.655. However, care had to be taken when interpreting this scale since the scale reliability is not as strong.

Table 2: Food naturalness Index (Sanchez-Silez, et. al., 2019)

Nr.	**Food naturalness index item**
1	I think this product doesn't contain any artificial ingredients
2	I think this product doesn't contain any preservatives
3	I think this product doesn't contain any additives
4	I think this product doesn't contain any artificial colour -and flavouring ingredients
5	I am worried this product contains chemical residues
6	I am worried that this product is genetically modified
7	I think this product contains natural ingredients (reversed item)
8	I think this product is highly processed
9	I prefer unprocessed products than processed products (reversed item)

Attitude

Attitude was measured using a semantic differential scale measuring five items. The scale items were previously in Smith, Terry, Manstead, Louis, Kotterman and Wolfs (2007) showing significant results. Participants had to respond on a five-point scale how much they agreed with following statement: I would experience eating this product as a replacement of traditional meat as…. which was followed by (1) good - bad, (2) pleasant - unpleasant, (3) enjoyable-unenjoyable, (4) foolish – wise and (5) safe- unsafe.

Attitude showed high reliability on the Cronbach's alpha with a 0.935, indicating a strong reliability on the attitude construct.

3.3.3 Moderator

Subjective technology knowledge

Subjective technology knowledge in this research was the moderator that was assumed to influences the perceived naturalness. The subjective technology knowledge construct was measured using an adjusted version of the nine-item scale used in Flynn & Goldsmith (1999). Flynn & Goldsmith (1999) developed a measurement scale based on single-self report items that can function as a valid and reliable measure of perceived subjective knowledge for consumer behavioural research; the subjective knowledge scale. Similarly, Perry and Morris (2005) showed significant results with the subjective knowledge scale with their research on the relationship between consumers financial knowledge, income and locus of control on their financial behaviour.

For this research seven out of the nine-items from the subjective knowledge scale were used, see table 3. All items were measured using a five-point Likert scale, ranging from 1 = I totally disagree to 5 = I totally agree. The Cronbach's Alpha for this subscale was 0.838 which indicated high internal reliability.

Table 3: Subjective knowledge scale by Flynn & Goldsmith 1999

nr.	subjective knowledge item
1	I know pretty much about [*X]*
2	I know how to judge the quality of *a [X]*
3	I think I know enough about *[X]* to feel pretty confident when I make a purchase
4	I do not feel very knowledgeable about [X] (reverse scored)
5	Among my circle of friends, I'm one of the "experts" on [X]
6	Compared to most other people, I know less about *[X]* (reversed scored)
7	When it comes to [X]. I really don't know a lot (reversed scored)

* [X] Being the construct of interest

3.3.4. Control variables

To assure the viability of this research the following control variables have been collected: gender, age, meat consumption and objective knowledge. The age of the participants was asked in an open question. Gender was based on an one-item question ranging from (1) male, (2) female, (3) Other and (4) I prefer not to tell and meat consumption was based on an one-item question ranging from (1) vegetarian/ vegan, (2) 1 or 2 times a week, (3) 3 or 4 times a week, (4) 5 or 6 times a week or (5) Daily.

Lastly, to control if consumers had any objective knowledge about IVM participant were asked how much they knew about the subject in an one-item question on a three-point ordinal scale; (1) I never heard of IVM, (2), I have heard about IVM, but do not know much about it, or (3) I already knew what IVM was. High objective knowledge could mean that respondents would already have preset judgements and attitude towards IVM, which was not the scope of this research and could therefore jeopardize the internal validity.

3.4 Procedure

To investigate the influence of framing on the behavioural intention to try IVM an online survey was built via the online survey software Qualtrics and was launched in week 48, 49 and 50 of 2019. Participation was entirely anonymous and voluntary. Respondents could withdraw at any time without prejudice. Appendix 1 gives an overview of the design of the survey.

First, respondents were given a short description of the aim of this survey. They were told that the study was about the potential of launching a new food technology and the research was interested in their opinion about it. After this they had to give their informed consent with a yes or no option. Indicating “yes” would lead respondents to the questionnaire. “No” would exclude them from the survey and respondents would be thanked for their participation. Regardless of their knowledge, all respondents were provided with a short informative text about the product and the technology. This short description contained the manipulation of the survey where participants were equally divided between the two conditions e.g. laboratory meat or animal-free meat. All other variables in the questionnaire were similar to each other.
Following this, participants were led through the different constructs of the questionnaire. The order of the questions was fixed, beginning with main questions on behavioural intention to try followed by perceived naturalness, attitude and subjective technology knowledge. After the main questions some general demographic question regarding gender, age, and meat consumption were asked. Finally, to measure the validity of objective knowledge participants had to answer one questions regarding their objective knowledge of the new technology. After completing the questionnaire participants were thanked for their participations. When respondents filled in the questionnaire during one of the two open survey days at the Forum building at the Wageningen Campus, respondents were given a small snack as a thank you.

3.5 Data Analysis

Data was analysed using SPSS data analysis program, version 24. To determine the reliability of the measured constructs of 'behavioural intention', 'perceived naturalness', 'attitude', and 'subjective knowledge', Cronbach's alpha was calculated. Beforehand, each item of the construct was combined into one mean composite variable. A Cronbach's alpha of α >0.7 was considered reliable. Similarly, for the significance *p*-values below *p*=<0.05 was considered statistically significant. Analysis of Variance (ANOVA) was performed see if 'meat consumption' and 'age' and 'objective knowledge' were successfully randomized. Pearson Chi-square were performed to see whether both conditions were successful in terms of equal distribution of 'gender'.

First, the direct effect of framing on the dependent variable of behavioural intention and perceived naturalness was tested via a one-way ANOVA. Multiple regressions were performed to determine if there was a mediating relationship of attitude on perceived naturalness and behavioural intention to try. Separately, it also showed if there was a relationship between perceived naturalness and attitude as well as for attitude and behavioural intention. Lastly, to measure the moderating effect of subjective knowledge on perceived naturalness across conditions a two-way ANOVA was performed.

4. Results

4.1 Descriptive information and randomization check

In total 201 respondents participated in the survey. Of the 201 respondents 36 were excluded from the data analysis. Amongst other reasons for exclusion were either incomplete and unreliable information or respondents who did not give their consent for using their data. Therefore, these respondents were deleted from the dataset and the remaining 165 participants were analysed using SPSS 24. From the 165 respondents 119 were female and 4 were male. The average age of the respondents was 26.35 years (SD=10.49). The majority of the participants (61,2%) were between the age of 20 and 25 years old, and the age ranged from 18 to 64 years, no outliers were found. In general, over than 80% of the respondents indicated to have at least heard or known about IVM. For meat consumption the frequencies were (1) Vegetarian/ vegan (18,2%), (2) 1 or 2 times per week meat (27,3%), (3) 3 or 4 times per week meat (26,1%), (4) 5 or 6 times per week meat (17,0%) and (5) Daily (11,5%).

Respondents were randomly assigned to one of the two conditions. To check whether the randomization was successful, a randomization check for age, gender, meat consumption and objective knowledge were performed, as can be found in table 4. Secondly, a test of normality and Q-Q plot were performed to see if the constructs were normally distributed across the two conditions. No significant differences were found between the conditions. ANOVA and Pearson Chi-square did not show significant differences between the two conditions. For age, meat consumption and objective knowledge ANOVAs were conducted showing age ($F(1,164) = 1.02$, $p=0.31$), meat consumption ($F(1,164) = 0.83$, $p=0.36$) and objective knowledge ($F(1,164) = 0.97$, $p=0.32$) not to be significant. Gender was analysed using a Chi-square ($X^2 = 1.18$, df = 1, $p= 0.27$) and also showed no significance. It can therefore be stated that all demographic variables showed no significance meaning and all variables were equally distributed between the two conditions.

4.2 Testing of the hypotheses

Main effect

An overview of the main effects of the constructs: behavioural intention, perceived naturalness and attitude be found in table 5.

Direct effect condition on behavioural intention to try IVM: a one-way ANOVA was conducted to determine if framing had a significant influence on the behavioural intention to try IVM. For this analysis behavioural intention was the dependent variable, and frame condition as the factor variable. Results showed a significant effect for behavioural intention ($F(1,163)=13.03$, $p=<0.01$, $\eta^2=0.07$), in a way that respondents in the animal-free meat condition (M=4.00, SD=0.76) indicated having higher level of behavioural intention to try IVM than respondents in the laboratory meat condition (M=3.42, SD=1.22). Hence, it can be stated that animal-free meat frame resulted in a higher behavioural intention to try IVM than the laboratory meat frame.

Effect condition on perceived naturalness: for perceived naturalness a one-way ANOVA was performed to test if framing had an effect on the perceived naturalness, in such a way that animal-free meat would lead to a higher positive perceived naturalness association than laboratory meat. In the one-way ANOVA perceived naturalness was the dependent variable, and frame condition as the factor variable. Results showed no significant effect on perceived naturalness ($F(1,163) =0.51$ $p=0.47$, $\eta^2=0.003$). Therefore, it can be concluded that the frame animal-free meat (M=2.66, SD=2.61) did not lead to more positive perceived naturalness associations than laboratory meat (M=2.61, SD=0.51).

Mediating effect

A mediation analysis was performed to determine whether perceived naturalness on respondent's behavioural intention to try IVM was mediated by their attitude towards IVM. This has been tested using a series of regression. Figure 2 gives a visual representation of the mediating effect, including the standardized β coefficients for the regressions. The proportion of variance of de dependent variable of 'behavioural intention to try IVM' explained by the independent variables was 39%. First, since there were no statistical differences between the two conditions, both data (n=165) were pooled together. The first regression analysis (A) showed that the perceived naturalness on attitude was significant. (β= -0.32, p=<0.01). The second regression (B) analysis showed that attitude was a significant predictor for behavioural intention (β= 0.85, p=<0.01). A third regression analysis (C) showed a positive effect of the perceived naturalness on the behavioural intention to try IVM (β= -0.34, p=0.03). Lastly, with perceived naturalness together with attitude as predictors (C'), perceived naturalness became insignificant (β= -0.075, p=0.56), whereas the effect of attitude towards IVM remained

significant (β= 0.85, p=<0.01). From this it can be concluded that independently perceived naturalness does lead to a higher chance for a positive attitude as well as a higher positive attitude would lead to a higher behavioural intention to try IVM. Thus, attitude does have an effect on behavioural intention, but does not mediate the effect of perceived naturalness.

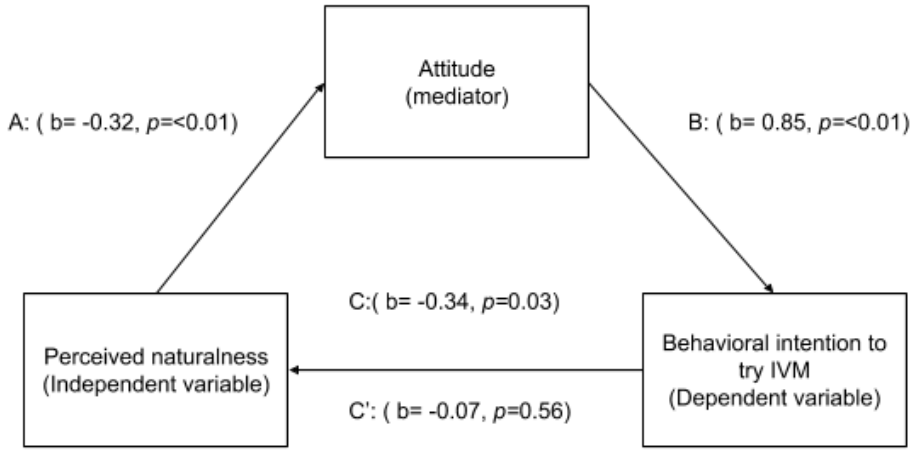

Figure 2: mediating effect of attitude on behavioural intention to try IVM

Moderating effect

A two-way ANOVA was conducted to examine the effects of the different conditions and subjective knowledge level on perceived naturalness, see table 6 for an overview. For this test a split in groups of subjective technology knowledge was made. Respondents who had a median of <2.71 were considered having low subjective technology knowledge and those who had a median of >2.71 were considered having high subjective technology knowledge. Perceived naturalness was the dependent variable and split subjective technology knowledge together with the condition were the fixed factors.

Results showed no statistically significant interaction effect between the conditions and perceived naturalness for "subjective knowledge" score, ($F(1,161)=0.02$, $p=0.88$, $\eta^2=<0.01$). Therefore, an analysis of the main effects for the different conditions were performed. There was no statistically significant difference in mean perceived naturalness between the two condition of laboratory meat and animal-free meat, ($F(1,161)=0.68$ $p=0.41$, $\eta^2=0.004$). Also, for subjective knowledge there was no statistically significant difference in perceived naturalness between respondents with either a higher or lower subjective knowledge, (F=1.161=1.06, $p=0.30$, $\eta^2=0.007$).

From this it can be concluded that subjective knowledge level does not influence the perceived naturalness of either conditions. In other words, respondents who indicated having a lower subjective knowledge did not respond more strongly to the frame of laboratory meat than respondents who indicated having high levels of subjective knowledge.

Table 4: Frequency table of control variables across conditions.

	Condition		
Characteristics	*Laboratory meat*	*Animal-free meat*	***Total sample***
Gender in No. Of responses			
Male	20	26	46
Female	63	56	119
Other	0	0	0
I prefer not to tell	0	0	0
Total	*83*	*82*	*165*
Average (Mean, SD)			*1.72 (0.45)*
Age (mean, SD)	27.17 (11.37)	25.51 (9.52)	26.35 (10.49)
Meat consumption (%)			
Vegetarian	10,3	7,9	18,2
1-2 times per week	1,7	14,5	27,3
3-4 times per week	14,5	11,5	26,1
5-6 times per week	8,5	8,5	17
Daily	4,2	7,3	11,5
Average (Mean, SD)	2.67 (0.26)	2.85 (0.14)	2.76 (1.25)
Objective knowledge level (%)			
No knowledge	9,7	7,9	17,6
Some knowledge	22,4	20	42,4
High knowledge	18,2	21,8	40
Average (Mean, SD)	2.17 (0.27)	2.28 (0.08)	2.22 (0.72)

Table 5: Main analysis using one-way analysis of the effect of each condition on the behavioural intention, perceived naturalness and attitude towards IVM.

Effect size per condition					
	laboratory meat (N=83)	**Animal_free meat (N=82)**			
	mean (SD)	*Mean (SD)*	*test statistic*	*p-value*	*η2*
Effect size on behavior intention					
Behavioural intention	3.42 (1.22)	4.00 (0.77)	F(1,163)=13.03	<0.01	0.07
Perceived naturalness	2,61 (0.51)	2.66 (0.49)	F(1,163)= 0.51	0.47	0.003
Attitude	3.30 (0.86)	3.45 (0.68)	F(1,163)= 1.625	0.20	0.002
a Meassured using a 5-point scale (range 1-5). b N unless otherwise stated					

Table 6: Moderating analysis of subjective technology knowledge on perceived naturalness per construct.

	Low Sub. Knowledge (N=33)	*High Sub. Knowledge (N=49)*	*Low Sub. Knowledge (N=42)*	*High Sub. Knowledge (N=41)*			
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Main effect condition (*P*-value)	Main effect Subjective knowledge (*P*-value)	Interaction effect *(P-value)*
Subjective knowledge	2.72 (0.38)	2.62 (0.57)	2.64 (0.50)	2.57 (0.52)	0.41	0.30	0.88

5. Discussion

The purpose of this study was to investigate what the influence of framing was on the attitude and behavioural intention to try in-vitro meat in the Netherlands. Also, this research investigated what the moderating effect of subjective technology knowledge was on the independent variables of perceived naturalness and framing condition. The present study builds and extends on the previous study of Bryant & Barnett (2019) on the influence of framing on behavioural intention to try in-vitro meat in the United-Kingdom, by testing what the effect of framing was in the Netherlands. This study was completed via an online questionnaire where consumers were invited to give their opinion on the different constructs and related items. In total five hypotheses were created to investigate this effect.

As expected, the way IVM was framed had a direct influence on the behavioural intention to try IVM***,*** in such a way that behavioural intention was higher when participants were allocated to the animal-free meat to those who were shown the laboratory meat. Consistent with literature on framing and attitude, positive associated terms would result in consumers having higher tendency to make more positive evaluations and associations, thus leading to more positive biases when an item is framed positive (Levin, Schneider and Gaeth, 1998; Gambara and Pinon, 2005). This explanation is in line with other research finding that behavioural intention is higher when a product is framed in a more positive light (Zahry & Besley, 2019; Bryant and Barnett, 2019**).** This significant may have been the result of the conceptually distinct frames. With animal-free evoked more heuristic attributes of positive animal use and more naturalness, whereas laboratory meat may have evoked more heuristics towards (chemical) process of the product. Creating a stronger positive emotional affect for animal-free meat that in turn created a positive judgement and perception (Kahneman & Frederick, 2002; Finucane et. al., 2000).

Perceived naturalness on the other hand, had no influence on the frames. It was expected that respondents would perceive the frame animal-free meat as more natural than laboratory meat. Existing literature indicated that naturalness is measured based on the associations and the process of the product (Rozin et. al, 2004 & 2005). Secondly, previous research (Siegrist and Sütterlin, 2017) on the importance of perceived naturalness for the acceptance of cultured meat showed evidence that consumers rely on symbolic information when evaluating food, that could lead to biased judgements and decisions. Therefore, it was assumed that animal-free meat would evoke more natural associations and would lead to a higher perceived naturalness than laboratory meat. However, it appears that animal-free meat influenced the perceived naturalness in a similar way as laboratory meat, both being on the lower end of the perceived naturalness scale. A possible explanation for the difference in the results between the outcome and the hypothesis might have been that consumers weighted

their opinion more on the given context (e.g. the subtext explaining the frame) and therefore it processes, rather than its context. Making the frame name not of significantly of influence on their perception and the perceived naturalness as expected (Rozin et. al. 2004).

The present study also aimed to explore a potential mediating effect to examine if perceived naturalness on the behavioural intention to try IVM was mediated by one's attitude towards it. Although it was found that the higher the perceived naturalness would lead to a more positive attitude individually, and a positive attitude would lead separately to a higher behavioural intention to try IVM this was not the due to the mediating effect. Attitude did not mediate the relationship between perceived naturalness and behavioural intention to try IVM. The findings did not correspond to the existing literature that showed a positive relationship between associations and attitude, in such a way that when the product evokes positive associations creates a higher chance for a positive attitude, and vice versa (Bekker, et. al. 2017; Pratkanis, 1998). Secondly, this was in contrast with previous found research of Bryant and Barnett (2019) that demonstrated that positive names (e.g. clean meat) evoked more associations with healthiness/nutrition, taste and naturalness in comparison to negative names such as cultured meat which were more associated with being processed and science. Their research showed that indirectly, these positive associations with the positive frames should also lead to more positive attitudes and intentions towards IVM. However, in comparison to Bryant and Barnett (2019) this study showed the same description for both frames. This could be an explanation for the absence of the attitude as mediator in the current study. Results may have deviated because respondents might have focused more on the contextual information and formed their attitude based on that rather than the frame name, thereby both conditions could have been evaluated similarly.

Lastly, it was expected that in-vitro meat was not yet familiar and subjective technology knowledge would moderate the relationship between the frames and perceived naturalness (Bekker et. al., 2017; Pratkanis, 1998). However, this turned out not to be significant. This was in contrast with findings of Garniere et. al. 2006 that found that subjective knowledge should be of support on new food technologies. One explanation for this deviation might have been that objective knowledge was fairly high amongst respondents. The majority of the respondents indicated to have at least heard of in-vitro meat or know what in-vitro meat is about. This might have influenced their attitude towards in-vitro meat, and a bias or already stored evaluations could have already formed in the consumers mind, resulting in more a negative attitude than anticipated (Kahneman & Frederick, 2002).

All in all, research showed that framing does have an effect on the behavioural intention to try in-vitro meat. However, this research has shown that perceived naturalness is not an indicator of how framing influences consumers behavioural intention to try in-vitro meat.

Limitations

This study had to acknowledge some limitations on the execution of this research.

Firstly, a limitation of this study sample is that the majority of the respondents were young undergraduate students from the Wageningen University. Since, the Wageningen University specializes in Food and Agriculture the high levels of objective knowledge could be allocated to this phenomenon. For future research it is therefore advised to try make a more homogenous mix of respondents from all ages and educational level.

Secondly, since in-vitro meat is yet to be made commercially available, consumers had to make judgements and associations based on similar categories or objects. Since these connections can be made momentary and without much cognitive deliberation this could affect the implicit or explicit attitudes. The question that arises is that we do not know which category or connections are made when it comes to in-vitro meat and how these network forming influences consumers attitudes (Bekker et. al., 2017).

The study performed by Barnett and Bryant (2019) used word associations to gain insights into consumer associations and attitudes towards in-vitro meat. The difference with word associations and direct questioning is that with word associations one is better able to more effectively and less consciously make associations undefined concepts. Participants in this study were only able to give their opinion about the frame and its explanation in a direct questioning. This may have been on influence on how respondents perceived the attitude items in relation to in-vitro meat resulting in more negative.

Future implications.

This research showed that perceived naturalness is not an indicator for how framing influences behavioural intention. The question arises if underlying reasoning may have been of influence or affecting the overall perceived naturalness. Itis speculated that perhaps moral or ethical reasoning, such as environmental influences, animal-rights etc. could be of reason (Hopkins, 2015; Verbeke, Sans and van Loo, 2015). It would therefore be interesting for future research to examine what framing does on the moral or ethical reasoning towards the behavioural intention to try in-vitro meat. Following from this, research could also focus on what the influence of different groups (e.g. consumers who do not eat meat due to of the animal suffering) would be on framing and behavioural intention to try or buy in-vitro meat. It is proven that meat-eaters are more likely to find IVM appealing that vegetarians (Wilks & Phillips, 2017).

As Bryant and Barnett (2019) already stated in their research, framing is dependent on culture and different nomenclature may have different meanings in other languages. This

research therefore emphasizes just as Bryant and Barnett emphasized the importance on the research of nomenclature framing in different languages. Dutch consumers indicated being fairly known with IVM and might therefore act different towards IVM, compared to other European countries or cultures and future research should extend on this knowledge.

Also, the framing of a new product might be differently categorized with consumers who eat meat in comparison to vegetarians. Future research could therefore also have a look at how categorization of this food (technologies) has an influence on how consumers attitude and behavioural intentions are formed.

Future communicators and marketing research departments could use this information to make more strategic choices on how understand how these terms influence the consumers perception and how to make them more appealing to shoppers. Further, this examination could contribute to the debate on in-vitro meat labelling and consumer purchase behaviour.

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7. Appendix

7.1. Enquête format

7.1 Enquête format

Construct	Items	Scale representation
Behavioural intention (α = 0.866) Scales used to measure behavioral intention to try, based on a modified version of Wilks and Phillips' behavioral Intention scale (Wilks and Phillips, 2017).	(1) I am willing to try this product	Five-point Likert scale (1 = totally disagree, 5= totally agree)
	(2) I am willing to try this product if it is better than traditional products.	
	(3) I am willing to buy this product if it is cheaper than conventional products.	
Naturalness (α = 0.655) Sales used to measure perceived naturalness, based on the modified version of Sanchez and colleagues' Food Naturalness Index (Sanchez, Michel, Román, Bernal, Philipsen, Haro and Siegris, 2019) .	(4) I think this product does not contain any artificial ingredients.	Five-point Likert scale (1 = totally disagree, 5= totally agree)

	(5) I think this product does not contain any conservatives	
	(6) I think this product does not contain any additives.	
	(7) I think this product does not contain any artificial colour -and flavouring ingredients.	
	(8) I am worried this product contains chemical residues.	
	(9) I am worried this product is genetically modified.	
	(10) I think this product contains only natural ingredients. (**reversed item)**	
	(11) I think this product is highly processed.	

	(12) I prefer unprocessed foods over processed foods. **(reversed item)**	
Attitude formation (α = 0.935) Scales used to measure attitude, based on a Smith and colleagues' Attitude scale (Smith, Manstead, Louis, Kotterman, Wolfs (2007).	(13) For me, I would experience eating this product as a replacement of conventional meat as.. **Bad - good**	Semantic five point differential scale (bipolar opposites)
	(14) For me, I would experiencing eating this product as a replacement of conventional meat as.. **Wise - foolish**	
	(15) For me, I would experiencing eating this product as a replacement of conventional meat as.. **Unenjoyable – enjoyable**	
	(16) For me, I would experiencing eating this product as a replacement of conventional meat as..	

	Unsatisfying – unsatisfying	
	(17) For me, I would experiencing eating this product as a replacement of conventional meat as.. **Unsafe – safe**	
Subjective technology knowledge (α = 0.838) Scales used to measure Subjective technology knowledge level, based on a modified version of Flynn & Goldsmith' Subjective knowledge scale (Flynn & Goldsmith, 1999).	(18) I know pretty much about this technological development	Five-point Likert scale (1 = totally disagree, 5= totally agree)
	(19) I know how to judge the quality of this technological development	
	(20) I think I know enough about this technological development to feel pretty confident when I make a purchase.	

	(21) I do not feel very knowledgeable about this technological development **(reversed score).**	
	(22) Amongst my circle of friends, I'm one of the "experts" on technological developments	
	(23) Compared to most other people, I know less about technological developments (**reversed score**)	
	(24) When it comes to technological developments, I really don't know a lot. (**reversed item)**	
(25) Gender	Male	One-item scale
	Female	
	Other	
	I prefer not to tell	
(26) Age	Open questions	Open question
(27) Meat consumption	Vegetarian/ Vegan	One item scale
	1 or 2 times a week	
	3 or 4 times a week	
	5 or 6 times a week	
	Daily	