

**THE IMPACT OF PRIOR ATTITUDES TOWARDS CULTURED AND
TRADITIONAL MEAT AND MESSAGE FRAMING IN SHAPING
CONSUMER ACCEPTANCE OF CULTURED MEAT**

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Abstract

This study explores the impact of individuals' prior attitudes towards traditional and cultured meat, message framing (approach vs. avoidance), and the role of attitudinal ambivalence and confirmation bias on consumer acceptance of cultured meat. In order to investigate this, a quantitative 2 x 2 within-subjects design was designed. Data was collected through a survey distributed among Dutch adults. Subsequently, multiple hierarchical linear regression analyses were conducted to test the five hypotheses. Findings reveal that weaker prior-attitudes towards cultured meat increase attitudinal ambivalence, while individuals high in attitudinal ambivalence towards traditional meat are more susceptible to attitude change by the type of information provided in this study. Moreover, it appeared that high attitudinal ambivalence towards cultured meat has a negative effect on people's attitude towards it. Message framing has no significant impact on attitude change. Surprisingly, weaker attitudes towards cultured meat are associated with higher confirmation bias, suggesting uncertainty drives selective exposure to information. However, confirmation bias does not significantly influence attitudes towards cultured meat in the context of this study, indicating other unknown factors play a more critical role. Recommendations for future studies include longitudinal studies and a deeper understanding of ambivalence reduction mechanisms and the role of confirmation bias in this domain.

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1. Introduction

Excessive meat consumption is widely recognized as a notable issue due to its substantial contribution to the total greenhouse gas emissions (Angelo & Du Plesis, 2017), biodiversity loss (Machovina et al., 2015) and the nitrogen cycle disruption (Stevens, 2019). To reduce these negative impacts, an imperative step would be to decrease consumption of it. However, recent research conducted by Dagevos and Verbeke (2022) on meat consumption in The Netherlands and Belgium indicates that some changes are occurring concerning consumer attitudes, awareness and intentions, but the actual change in dietary habits is still not overly present. In fact, their research suggests that the existing meat-centred food system and its dominating culture are still in place in both countries, despite the increasing awareness about the drawbacks of consuming meat.

Despite the reluctance in attitude change, the issues associated with the production of meat are currently known by a large and increasing part of the population in western civilisations (Sanchez-Sabate & Sabaté, 2019). Several food suppliers are trying to respond to this increasing awareness and are therefore offering meat substitutes, like 'plant-based meat'. The fact that producers believe it to be necessary for plant-based alternatives to possess meat-like characteristics, is indicative of how embedded meat is in western cultures (Nungesser & Winter, 2021). Although the market share of meat substitutes like these are growing, it does not substantially affect the traditional meat market. Additionally, these products cannot not be viewed as nutritionally interchangeable for actual animal-derived meat (Van Vliet et al., 2021). Instead, they should rather be seen as complementary to other alternative protein sources (Neuhofer & Lusk, 2022).

A relatively new potential alternative protein source is 'cultured meat'. This novel food technology makes use of animals that are alive to take a biopsy. The muscles are sliced to release stem cells, which have the capacity to multiply but can also differentiate into many cell types, including fat and muscle cells (Post, 2014). Cultured meat is by many seen as promising and has the potential of reducing traditional meat consumption, as consumers would still be able to consume 'meat' without many of the disadvantages that the consumption of traditional meat brings along. For example, the need for animals in meat production is considerably reduced in the production process of cultured meat. This could potentially lead to improved animal welfare standards and decreased environmental impact compared to traditional meat production (Schaefer & Savulescu, 2014).

Cultured meat is expected to be beneficial concerning environmental sustainability relative to traditional meat production by several researchers, as its production requires significantly less land, (potentially) lower greenhouse gas emissions and less water (Tuomisto & De Mattos, 2011). However, it should be noted that multiple studies indicate that it is still debatable whether the production of cultured meat really coincides with a decrease in greenhouse gas emissions compared to the production of traditional meat (especially compared to poultry) or other meat substitutes (Chriki & Hocquette, 2020; Lynch & Pierrehumbert, 2019). Despite these uncertainties, cultured meat has been hailed as an exciting new food technology that has the potential to have multiple benefits over traditional meat production, especially concerning animal welfare and environmental sustainability. In conclusion, future research and developments in this area might result in a more sustainable and viable alternative for traditional meat, which makes it relevant to explore the likelihood of its future market success.

Although most studies have concluded that a substantial portion of the population is open to try cultured meat, a notable quantity of participants within multiple studies are showing a more reluctant attitude towards this new food technology as well (Kantor & Kantor, 2021; Palmieri et al., 2020; Weinrich et al., 2020; Zhang et al., 2020). Especially the lack of perceived 'naturalness' seems to lower the level of acceptance (Siegrist et al., 2018). Anyhow, what has become evident through the majority of studies, is that the type of information provided and how it is presented (framed) is of utmost importance in order to influence consumer acceptance (Siegrist et al., 2018; Bryant & Dillard, 2019; Bryant & Barnett, 2018; Bekker et al., 2017; Bekker et al., 2021). Leaving aspects out or putting more/less emphasis on certain aspects to make complex concepts easier to understand is important for consumer perception (Bubela et al., 2009; Nisbet & Mooney, 2007). In this manner, Bryant & Dillard (2019) concluded in their study that framing cultured meat as "high-tech" contributes to the development of a more negative attitude towards cultured meat. Additionally, Bekker et al. (2017) have shown how explicit attitudes about cultured meat were altered by providing both positive and negative information.

Limited research has been conducted to determine whether presenting information about cultured meat in a positively (approach framing) or presenting information about traditional meat in a negatively (avoidance framing), is a more effective method in increasing consumer acceptance of cultured meat, while also considering pre-existing attitudes. Existing studies on consumer acceptance of other novel food technologies, such as genetically modified foods and nanotechnology, do not provide a definitive answer to whether approach-framing of the new food technology or avoidance framing of the conventional practice is more effective in increasing consumer acceptance of the novel technology either (Conti et al., 2011; Pjseivac et al. 2020; Heiman & Zilberman 2011).

The study by Sheng et al. (2022) is among the few studies that meet the research criteria mentioned in the previous paragraph, specifically regarding cultured meat. They found that gain-oriented messages were effective for promotion-focused participants, while both avoidance- and gain-oriented messages had a positive effect on consumer acceptance for prevention-focused participants. Also, they found that both gain- and avoidance-oriented messages were more effective in increasing consumer acceptance than neutral messages (Sheng et al., 2022). Another comparable study conducted by J. Zhang et al (2022), also measured prior-attitudes towards traditional and artificial meat (including cultured meat) and presented their respondents with neutral, approach- and avoidance-type of messages. They found that both avoidance- and approach-oriented messages increased willingness to pay compared to neutral messages as well. Additionally, they found that individual's willingness to pay was higher when regulatory focus (promotion focus vs. prevention focus) fitted the type of message they received. Hence, the main difference between the two studies is the focus on the broader concept of consumer acceptance in the study by Sheng et al. (2022), while the study by Zhang et al. (2022) focused on willingness to pay.

Their studies are similar to each other and include measuring prior-attitudes towards both traditional and cultured meat and provide approach- and avoidance-type of messages to their participants. However, their primary objective does not involve investigating how the (in)congruency between prior-attitudes towards both cultured and traditional meat in combination with the type of message influences people's attitudes towards cultured meat. In contrast, this study will focus precisely on this relationship. The types of messages that will be communicated in this study are approach-oriented on cultured meat and avoidance-oriented

on traditional meat, similar to the study by Sheng et al. (2022) and J. Zhang et al (2022). Clarification concerning this topic would be useful in order to improve strategies that are aiming to increase acceptance of this new food technology.

2. Research questions

Main RQ: How does the (in)congruency between individuals' prior-attitude towards traditional and cultured meat and the type of message provided (approach vs. avoidance) affect post-attitudes towards cultured meat?

Sub-questions:

1. How do consumers' prior-attitudes regarding traditional and cultured meat affect their attitude towards cultured meat, and which framing tactics (approach vs. avoidance) could effectively change these attitudes?
2. How does the approach-message regarding cultured meat affect individuals having a highly ambivalent attitude towards it?
3. How does the avoid-message on traditional meat affect individuals having a highly ambivalent attitude towards cultured meat or traditional meat?
4. What role does confirmation bias play in the perception of the different message frames and how does this concept eventually affect consumer acceptance and attitude towards cultured meat?

3. Theoretical framework

Figure 1 presents a preliminary draft of the conceptual model for this study. It illustrates a compact overview of the main concepts. The figure depicts the different types of messages included in this study: approach-oriented message (positive) towards cultured meat or avoidance-oriented message (negative) towards traditional meat. Moreover, it incorporates the prior-attitudes towards both traditional and cultured meat. Subsequently, the interaction between the message type and the prior-attitudes can result in either congruency or incongruency. Eventually, the degree of congruency between prior-attitudes and post-attitude is expected to be substantially influenced by the strength of one's attitude. Importantly as well, the degree of this (in)congruency is expected to influence the post-attitude of participants towards cultured meat. The following paragraphs discuss several theories and underlying mechanisms that are relevant to understand the cognitive processes that individuals are expected to experience when participating in this study. At the end of this chapter, a more comprehensive and detailed conceptual model is enclosed which includes the theories discussed below.

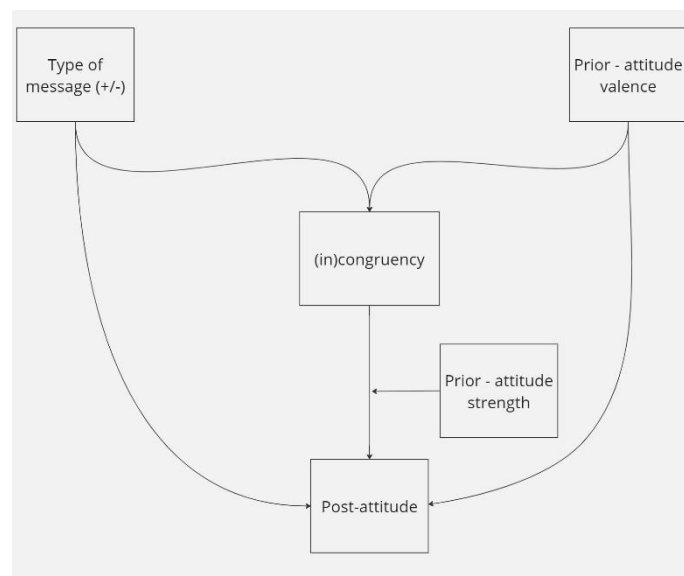


Figure 1: Preliminary conceptual model

Currently, consumers are expected to have prior knowledge on the positive and/or negative characteristics aspects of traditional meat. This prior knowledge is likely to create a certain pre-existing attitude (prior-attitude), which is important in studies investigating the effect of messages on attitudes, as they serve as a baseline. On the other hand, prior-attitudes towards cultured meat are not expected to be overly present, as the concept is relatively new and knowledge on it is likely to be limited among a large segment of participants. However, participants are only allowed to participate when having basic knowledge on the concept of cultured meat.

These prior-attitudes could (in combination with conflicting information) lead to the experience of attitudinal ambivalence, as described by Van Harreveld et al., (2009). The theory of attitudinal ambivalence suggests that people are in general conflict-averse in terms of their beliefs and/or emotions that underly their attitudes. Doubts about potential outcomes can arise when there are conflicting evaluative elements within an attitude, creating incongruence. Thus,

when attitudinal ambivalence occurs, individuals associate both positive and negative characteristics to an object or construct simultaneously.

Since cultured meat is not yet available in The Netherlands, attitudinal ambivalence in this case is anticipatory (i.e. anticipatory ambivalence), as conflicting attitudes/emotions one might experience are based on anticipating future decisions or events (Bee & Madrigal, 2013). Furthermore, the same study has shown that anticipatory ambivalence affected attitudes and intentions negatively (Bee & Madrigal, 2013.). In case individuals experience ambivalence, it becomes difficult to predict their subsequent attitudes and behaviours, as they might employ various coping strategies. Three of these coping strategies are emotion-focused coping (denying responsibility and decision avoidance), problem-focused coping (effortful processing and attitude change) and less effortful problem focused-coping (biased processing and heuristics) (Van Harreveld et al., 2009).

Emotion-focused coping leads to negative emotions associated with making the wrong choice. Therefore, people may delay making a decision or avoid making one altogether when faced with a difficult choice. Denying responsibility is also common for people utilising this coping strategy. This strategy may help to decrease the anticipated regret (Harreveld et al., 2009). When problem-focused coping occurs, an attempt is typically made to mitigate uncertainty and boost confidence through extensively acquiring information to decrease this uncertainty. Over time, this demanding cognitive process can aid in reducing ambivalence and could even cause attitude change (Harreveld et al., 2009).

Problem-focused coping may entail biased systematic processing (less-effortful problem-focused coping), which requires less effort than unbiased processing. Holders of ambivalent attitude can decrease their ambivalence as a result of biased processing that results in selective attention for information about the attitude or object/construct. Ambivalent attitudes holders may behave heuristically as well, by following the masses or selecting the same course of action as someone they regard as an authority figure (Harreveld et al., 2009). Additionally, as attitudinal ambivalence increases, people tend to avoid the concepts that manifests the ambivalence. Meaning that the ambivalence is made latent. Although people are not even aware of their latent feelings, these express themselves indirectly and symbolically (Russell et al., 2011).

Furthermore, as attitudinal ambivalence and neutrality seem similar concepts, it is important to note that a neutral attitude can be both high and low in ambivalence. When a person links weak or no particular positive or negative elements to a concept, their attitude can be seen as neutral and low in ambivalence. On the other hand, when a person associates very positive and very negative affiliations to a concept, their attitude is still neutral but high in ambivalence (Hartnett et al., 2009). Petty et al. (2006) and Zemborain en Johar (2007), indicate that high levels of attitudinal ambivalence enhances the possibility of new information transforming attitudes. Not only Individuals with neutral prior-attitudes could experience attitudinal ambivalence. Others who already have slightly steered prior-attitudes concerning traditional meat or cultured meat could experience attitudinal ambivalence as well. For example, in case an individual has a slightly negative prior-attitudes towards cultured meat, presenting (new) positive information about it is unlikely to change the attitude itself, but the degree of attitudinal ambivalence might increase and thereby uncertainty about one's attitude is likely to increase (Tormala, Clarkson & Petty, 2006). The attitudinal ambivalence theory applied to this study leads to the following hypotheses:

H1A: Stronger attitudes weaken the influence of low congruency on attitudinal ambivalence.

H1B: Participants high in attitudinal ambivalence are expected to be more susceptible to attitude change by the type of information provided by them in this study.

Previous studies have consistently demonstrated a robust link between attitudinal ambivalence and negative affect such as uncertainty (Clarkson et al., 2008; Harreveld et al. 2009; Luttrell et al., 2016). Notably, a study by Harreveld et al. (2009) suggests that feelings of discomfort are intensified when a choice has to be made. Van Harreveld et al. (2015) indicate that it was found that several self-reported negative emotions increased by choices made in a state of ambivalence. Undoubtedly, uncertainty and other negative affect associated with ambivalence play an important role in this particular study, as cultured meat is still rather unfamiliar to the majority of the population. It is however important to make a distinction between uncertainty and ambivalence, as uncertainty represents the degree of trust with which one holds certain thoughts and beliefs, whereas ambivalence represents the balance between considerations that one has towards a construct or object (Rudolph, 2011). Uncertainty can be caused by limited knowledge on the topic at hand, as well as by feelings of ambivalence.

Furthermore, McGraw et al. (2003) have shown that subjective ambivalence would result in more negative evaluations. Additionally, a study conducted by Bee & Madrigal (2013) found that people high in ambivalence and unstable in their attitudes are more likely to delay a purchase. Moreover, they found that anticipatory ambivalence exerted an adverse impact on both attitudes and intentions. On this basis Hypothesis 2 is formulated:

H2: High levels of attitudinal ambivalence towards cultured meat will negatively impact its acceptance.

Secondly, the theory of cognitive dissonance introduced by Festinger will be relevant for this study. This theory suggests that individuals possess a natural desire to keep their behaviours and attitudes aligned (Harmon-Jones & Mills, 2019). The experience of cognitive dissonance is definitely not uncommon for meat-eaters. They are driven to avoid experiencing meat-related cognitive dissonance by dismissing animal welfare, environmental, or health issues with meat intake in order to escape the negative emotional state it causes (Rothgerber & Rosenfeld, 2021). To illustrate; Rothgerber (2014) found that meat-eaters developed an urge to maintain consuming meat through selective cognitive modification, after being exposed to vignettes showing several types of vegetarians.

Additionally, Although four of the five participants in the qualitative study conducted by Mann & Renaux (2021) believed eating meat to be problematic, none of them has ever felt the need to address this urgently earlier in their lives or during the conducted interviews. Despite the fact that the dissonance expressed itself different for all participants, they all concluded that eating meat is such an established pattern in our society that there is no need for justification.

Cognitive dissonance theory applied to this study is relevant for individuals holding strong prior-attitudes on either meat or cultured meat, and get presented with conflicting information. Anyhow, it is expected that most of the strong prior-attitudes are related to traditional meat rather than cultured meat. That is because traditional meat is by many seen as a sensitive and emotional topic (Benningstad & Kunst, 2020; Fessler et al., 2003), while cultured meat is still an unfamiliar topic for many and also not yet available in The Netherlands. Therefore, it is not expected that many individuals hold strong prior-attitudes concerning this concept.

As mentioned in the earlier conducted studies about cognitive dissonance and meat-eating, most meat-eaters dismiss, ignore or denigrate information about the adverse effects of meat consumption. Most have shown to not be willing to change their routine and behaviour. Consequently, Cognitive dissonance in this study is expected to lead to the rejection of the novel food concept that is attempting to mimic traditional meat. In case respondents with highly positive attitudes towards traditional meat want to prevent cognitive dissonance at all cost, they might experience confirmation bias when presented with negatively presented information about it. This is then believed to lead to the rejection of cultured meat as well. It is expected that more confidence in one's attitudes will lead to higher levels of confirmation bias when presented with conflicting information, while less confidence in one's attitude should lead to less confirmation bias. Confirmation bias and its appliance to this study will be further discussed in the following paragraph.

Notably, Individuals in the study by Sawicki et al. (2011) preferred information which was compatible with their prior views rather than information that was divergent. This phenomenon is known as confirmation bias, as introduced by Wason (1960), and is important as well concerning this study. The reasoning behind this theory suggests that it occurs when individuals tend to disregard or rationalise information that contradicts their pre-existing views or theories, while selectively seeking out and interpreting information in a manner that confirms their prior views (Peters, 2020).

According to Sweeny et al. (2010), people choose to ignore information due to three main reasons. First of all, people want to prevent changing their beliefs, since this causes cognitive dissonance. Individuals are always trying to be consistent in what they believe and guard their standpoints. This is particularly true after they recently reported a thought or disposition, which is an activity the participants of this study will conduct (Hart et al., 2009). Accordingly, confirmation bias could be seen as a coping mechanism when experiencing cognitive dissonance. Secondly, the required actions associated with behaviour change based on the information given can be perceived as disadvantageous. For example, people could be reluctant to change their diet to be more healthy, due to the higher costs a healthy diet brings along. And thirdly, the negative emotions evoked by information contradicting with one's prior beliefs is a reason to ignore it as well.

A great amount of evidence exist that confirmation bias occurs often in relation to meat-eating and information about farm animal welfare as well as climate change (Bryant et al., 2022). Individuals who eat meat often suppose information about animal abuse is untrustworthy and agenda-driven (Lentz et al., 2018;). Although the effect of confirmation bias has not yet been investigated for the acceptance of cultured meat, the reasoning behind this theory seems to be applicable here as well.

In this study, confirmation bias is expected to occur when individuals having strong positive prior-attitudes on traditional meat are confronted with negative information about it. Additionally, it is expected that a similar cognitive process might occur when an individual with a strong negative prior-attitudes on cultured meat is presented with positive information about it. According to the confirmation bias theory, this information is very likely to be ignored. It is also expected that confirmation bias increases as the strength and confidence in one's attitude is high (Schweiger & Cress, 2019). Based on the reasoning behind the theories discussed, the following hypotheses are formulated:

H3A: Participants with strong attitudes and low congruency between their prior-attitude and the provided message are highly susceptible to confirmation bias.

H3B: Participants experiencing confirmation bias in this study are more likely to express a negative post-attitude towards cultured meat

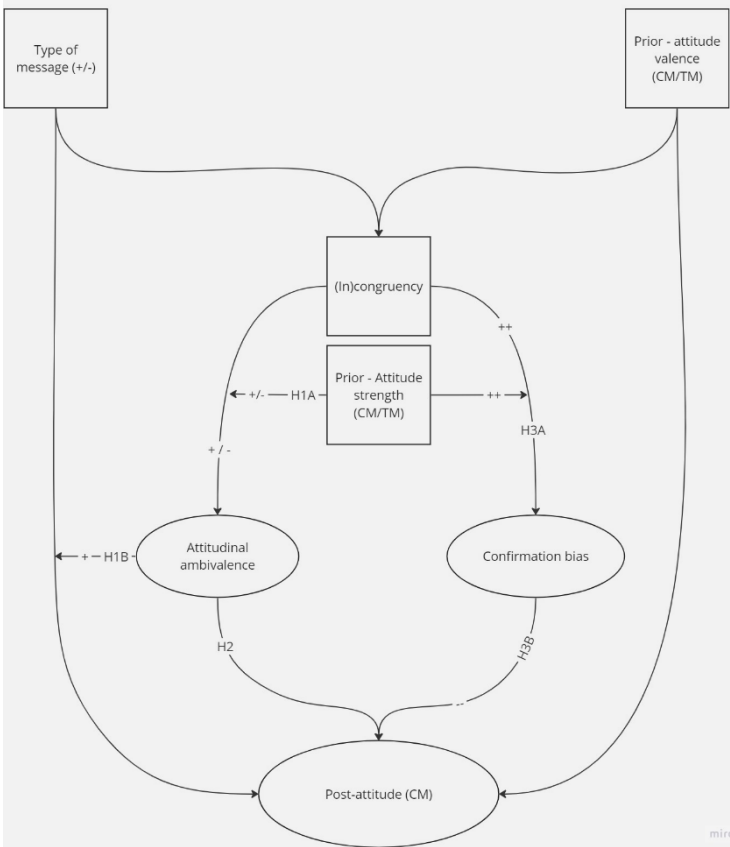


Figure 2: Detailed conceptual model

Figure 2 shows a more elaborated and detailed conceptual model incorporating the theories discussed throughout this chapter. The model suggests that low congruency between type of message and prior-attitude moderated by attitude strength matter greatly to determine which cognitive direction the participants will follow. It is hypothesised that participants experiencing high incongruence are expected to encounter cognitive dissonance and resort to confirmation bias as a coping mechanism. Confirmation bias will lead to rejection/downgrading of the presented information. On the other hand, participants who fall neither into the extremely high or extremely low (in)congruency categories and do not have extremely low or extremely high attitude strength, are anticipated to adopt a more indecisive and neutral attitude. People who fall in this category are expected to be more likely to enter into a stage of attitudinal ambivalence. This will subsequently lead to adverse cognitive processes such as feelings of uncertainty, which is hypothesised to have a negative effect on post-attitude evaluations.

4. Methods

4.1 Design and data collection

In this study, data was collected through the distribution of a survey. A quantitative experimental design was used. Specifically, a 2 x 2 within-subjects design has been employed. While not all participants did receive the same message, they all received the same survey questions, indicating a within-subjects design. The design included two independent variables: the type of message (avoidance vs. approach) and the prior-attitude of the participants (traditional meat vs cultured meat). A convenience sampling strategy was implemented for this study, in which Dutch adult participants were recruited via online platforms and via word to mouth. A G*power power analysis has been conducted in order to determine the required sample size (N= 173).

4.2 Stimuli

In this study, participants will be exposed to different types of messages regarding cultured meat and traditional meat. The stimuli that the participants will receive will be either the approach-type of message on cultured meat or the avoidance-type of message on traditional meat. To further investigate potential interaction effects, two additional conditions are included: an approach-type of message on traditional meat and an the avoidance-type of message on cultured meat. The presented message can be either congruent or incongruent with the prior-attitude of the participant. In the survey the messages will be provided in Dutch. The approach-type of message concerning cultured meat reads as follows:

*“Cultured meat **brings along huge benefits for both** animal welfare and environmental sustainability. **Cultured meat production allows animals to live and be subjected to calm and comfortable living environments. This new food technology can be seen as a transformative development** concerning environmental sustainability as well. Moreover, recent studies indicate that **cultured meat** is doing significantly better in terms of environmental impact on our planet compared to **traditional meat**. It is very efficient in usage of resources **such as land, water and feed**.*

The approach-message on traditional meat reads as follows:

*“**Farmers and other stakeholders are working hard to improve both** the animal welfare and environmental sustainability **within the traditional meat sector. Traditional meat production allows for the production of real and naturally produced meat. The traditional meat sector can be seen as one of the sectors making the biggest improvements** concerning environmental sustainability as well. Moreover, recent studies indicate that **traditional meat** is doing significantly better in terms of environmental impact on our planet compared to **cultured meat**. It is very efficient in usage of resources, **as every part of the animal is eventually used to produce something**.*

the avoidance-type of message concerning cultured meat will be presented as follows:

*“Multiple studies have already shown the drawbacks of **cultured meat** production, especially concerning remaining animal welfare and environmental sustainability issues. It entails **unclearities in relation to the long-term welfare of animals involved in the sampling process**. Additionally, its production entails drawbacks concerning environmental sustainability as well. Moreover, it is believed that the production of **cultured meat** currently has a more harmful impact on our planet compared to the production of **traditional meat**. Also, **cultured meat** production is inefficient concerning resource usage, as it requires a lot of **energy**.*

The avoidance-type of message on traditional meat that participants in the other condition will receive is worded as follows:

*“Multiple studies have already shown the drawbacks of **traditional meat** production, especially concerning remaining animal welfare and environmental sustainability issues. It entails **large-scale slaughtering of animals, which often goes hand in hand with abuse in slaughterhouses**. Additionally, its production entails drawbacks concerning environmental sustainability as well. Moreover, it is believed that the production of **traditional meat** currently has a more harmful impact on our planet compared to the production of **alternatives such as cultured meat**. Also, **Traditional meat** production is inefficient concerning resource usage, as it requires a lot of **land, water and feed**.”*

Table 1 sums up all the differences between the messages in order to provide a clear overview and for comparison.

Table 1: Comparisons between conditions

	Cultured meat	Traditional meat
Positive	<ol style="list-style-type: none"> 1. This brings along huge benefits for ... 2. Cultured meat production (allows) animals to live and be subjected to calm and comfortable living environments. 3. This new food technology ... as a transformative development ... 4. Cultured meat ... traditional meat 5. such as land, water and feed. 	<ol style="list-style-type: none"> 1. Anyway, farmers and other stakeholders are working hard to improve ... within the traditional meat sector. 2. Traditional meat production (allows) for the production of real and naturally produced meat. 3. The traditional meat sector ... one of the sectors making the biggest improvements concerning ... 4. Traditional meat ... cultured meat 5. as every part of the animal is eventually used to produce something.
Negative	<ol style="list-style-type: none"> 1. However, ... cultured meat 2. unclearities in relation to the long-term welfare of animals involved in the sampling process. 3. cultured meat ... traditional meat. 4. Cultured meat ... Energy. 	<ol style="list-style-type: none"> 1. Traditional meat 2. Large-scale slaughtering of animals, which often goes hand in hand with abuse in slaughterhouses. 3. traditional meat ... alternatives such as cultured meat. 4. Traditional meat ... land, water and feed.

4.3 Measures

Prior-attitudes and post-attitude were measured by exposing the participants to statements related to both cultured and traditional meat. These attitudes are measured by using a similar method as has been applied in the study by (Van Dijk et al., 2012). This study has shown to be effective in capturing attitude change. The research selected two sets of items. One set to measure prior-attitudes and another set to measure post-attitudes. The set for measuring prior-attitudes included the four semantic differential items: *“bad-good”*, *“unfavourable-favourable”*, *“undesirable-desirable”*, and *“inappropriate”-“appropriate”*. In order to measure post-attitudes, four different but similar semantic differential items are used: *“dislikeable-likeable”*, *“disagreeable-agreeable”*, *“unsatisfactory-satisfactory”* and *“negative-positive”*. For both prior- and post-attitudes, participants have rated each item on a 7-point scale. However, the item: *“undesirable-desirable”* (*“ongewenst-gewenst In Dutch*) might be too specific in this context and focuses on a particular aspect, which may not align well with the general evaluation of attitudes. Therefore this item is replaced by the item: *“beneficial-harmful”* as used by Azjen & Fishbein (2000).

Although the terms used to measure prior- and post-attitude differ, two-pre-tests that were conducted with separate groups of participants (N=41 and N=44) confirmed that the means regarding the two scales did not differ significantly for prior- and post-attitudes. This provides

evidence for the consistency of this measurement method (Van Dijk et al., 2012). Thus, by employing this established measurement technique, it was made possible to capture and evaluate changes in the attitude of participants.

Attitude strength could be described as the extent to which individuals are aware of their feeling towards a specific construct or object. The degree of self-reported cognitive effort is an indicative component to assess attitude strength and is combined of two scales as described by Krosnick and Petty (1995). Participants have been asked to assess the amount of effort they invested in answering on a 7-point scale item (Petty et al., 1977). That is because participants who act indifferent towards the constructs are expected to not engage extensively in cognitive processing and are therefore more likely to report using relatively little cognitive effort. This indifferent attitude positively correlates with low attitude strength. The question here included in the survey here will be the following: *“How much mental effort did you put into evaluating cultured meat and traditional meat?”*

Furthermore, attitude strength has been evaluated by measuring participants concerning their confidence in the validity of their attitude towards both cultured and traditional meat (attitude correctness). This measure is based on research conducted by Petrocelli et al. (2007). Individuals who lack knowledge about their attitude or possess only limited confidence in their attitude towards cultured or traditional meat should be considered indifferent towards this topic. Attitude strength will be measured by means of a 7-point scale item (extremely certain – extremely uncertain) and by including the following questions: *“To what extent are you convinced that other people should have the same attitude as you concerning cultured/traditional meat?”* and: *“To what extent are you confident that your attitude towards culture/traditional represents the correct perspective on the issue among all possible attitudes one might hold?”*.

Congruency between the type of message and the prior-attitude have also been measured by using a 7-point Likert scale designed for this study, ranging from strongly disagreeing with the message to strongly agreeing with the message. The item has been formulated as follows:

“Please indicate the extent to which you agree or disagree with the following message:

I ... with the message just presented to me.

- 1- Strongly disagree
- 2- Disagree
- 3- Somewhat disagree
- 4- Am neutral
- 5- Somewhat agree
- 6- Agree
- 7- Strongly agree

Attitudinal ambivalence has been measured by using a method similar the one employed in a study by Onwezen et al. (2022) to assess attitudinal ambivalence both items are scored on a 1 to 7 scale, with higher scores indicating higher levels of ambivalence:

“I have no mixed feelings/ I have strong mixed feelings towards cultured/traditional meat”.

Confirmation bias was measured by using a measurement technique similar to the one used in the study conducted Meppelink et al. (2019) that investigated confirmation bias in relation to vaccination and online health information seeking. In this study, participants were presented with five clearly negative and five clearly positive headings of news articles. They were then asked to pick the top five headers they would like to learn more about. Based on their choices, researchers calculated sum scores ranging from 0 (representing all negative selections) to 5

(representing all positive selections) in order to indicate the valence of selected headers. A higher score in this context indicates the selection of more positive messages. The mean score and standard deviation were calculated as well.

Regarding this study, 12 headers have been created in total. These headers were divided into six for cultured and six for traditional meat. Among these six headers, three are clearly negative, while the other three are clearly positive. In both the cultured and traditional meat categories, two headings focus on environmental sustainability, while the other two headings address animal welfare. This balance is maintained to accommodate for respondents who may have a greater interest in either environmental sustainability or animal welfare. The topics of the remaining two headings are more general in nature. Participants selecting mainly positive headings on traditional meat are seen as confirmatory bias towards traditional meat, while participants selecting mainly negative headings on cultured meat are seen as confirmatory bias towards cultured meat. The number of headers in this study has been intentionally reduced to avoid overwhelming participants with excessive amounts of reading. Table 2 shows the headings that have been presented to the participants.

Table 2: News headings presented to participants

	Cultured meat	Traditional meat
Positive	<ol style="list-style-type: none"> 1. <i>“Cultured meat: the answer to we are going to reduce our environmental footprint.”</i> 2. <i>“The role of cultured meat in reducing animal suffering.”</i> 3. <i>“How cultured meat empowers consumer choice as an ethical and sustainable option.”</i> 	<ol style="list-style-type: none"> 1. <i>“The efficiency of the meat industry and what we can learn from it.”</i> 2. <i>“Improvements in animal welfare standards in the meat industry.”</i> 3. <i>“The vital role of meat consumption in sustaining traditions, culture and authentic cuisines”.</i>
Negative	<ol style="list-style-type: none"> 1. <i>“Unveiling animal welfare drawbacks of cultured meat.”</i> 2. <i>“Concerns about the high energy usage for the production of cultured meat.”</i> 3. <i>“Examining the hidden downsides and risks of cultured meat.”</i> 	<ol style="list-style-type: none"> 1. <i>“Uncovering the animal welfare concerns in the production of meat”.</i> 2. <i>“Uncovering the environmental sustainability issues in relation to meat production.”</i> 3. <i>“A comprehensive exploration of all concerns in relation to meat production and consumption.”</i>

Degree of *Food neophobia* was expected to influence attitude towards cultured meat as well, and will therefore be measured by using the food neophobia scale (FNS). The FNS created by Pliner and Hobden (1992) consists of ten items, each of which is rated on a Likert-type scale from 1 (strongly agree) to 7 (strongly disagree). Eventually Higher scores on the scale indicate higher levels of Food Neophobia. An illustration of questions included for the FNS are the following: ‘I am constantly sampling new and different foods’, ‘I like to try new foods whenever I can’, and ‘I am always interested in tasting foods that I’ve never had before. Again, the number of items has been decreased (to three items), as it is expected that the survey will be too extensive otherwise.

4.4 Procedure

First of all, the participants were exposed to two control questions to check whether the person in question has basic knowledge on the concept of cultured meat. These were the following multiple-choice questions: *“Have you ever heard of cultured meat before”* and *“Which of the following explanations describes cultured meat best in your opinion?”*. If they were allowed to advance, they were briefed with a message explaining the purpose of this study. After this introduction, demographic information such as gender, age and education level was collected. Afterwards, all participants were measured on prior-attitude and attitude strength towards both cultured meat and traditional meat. They have rated their attitudes on a 7-point Likert scale ranging from strongly disagree to strongly agree.

After measuring their prior-attitudes towards these concepts, the participants were randomly assigned to one of the four experimental groups: meat (1) approach-type of message on cultured meat, (2, control group) approach-type of message on traditional meat, (3, control group) avoidance-type of message on cultured meat, (4) avoidance-type of message on traditional meat. After the manipulation, (in)congruency between prior-attitude and the type of message received have been measured by a one-item 7-point Likert scale ranging from strongly agreeing with the message to strongly disagreeing with the message. Subsequently, participants have completed a question on a semantic differential scale to determine attitudinal ambivalence.

Confirmation bias is another relevant cognitive bias that has been measured. After answering questions about attitudinal ambivalence, respondents have been presented with six headers of mock news-articles. Half of these were clearly negative on cultured meat, while half of these were clearly positive about it. Participants have selected three articles they would like to click on to receive extended information. A similar procedure has followed for traditional meat. A sum score ranging from 0 to 1 has been generated, by indicating the valence of selected headers. After this, the procedure will follow for traditional meat. Lastly, post-attitude towards cultured meat were measured, similar as to the measurement of prior-attitude towards cultured meat. However, in order to measure post-attitudes towards cultured meat, synonyms are applied for the words which were used measure prior-attitudes towards cultured meat.

4.5 Data analysis

The first step in analysing the data consisted of data screening. This entailed summarising the descriptive statistics, such as means, standard deviations and F-values of the background and main variables divided over the four different experimental conditions. Also, a reliability analysis has been conducted using Cronbach’s alpha for several constructs. Hereby internal consistency was safeguarded. Items that did not sufficiently contribute to the measurement of a particular construct were removed. Also, correlation analysis was performed to examine significant relations between variables by using Pearson’s correlation coefficients. Subsequently, variables were constructed and recoded as portrayed in chapter 4.3. In addition, dummy variables were created to the main and interaction effect of the four different messages.

Eventually, the hypotheses as drawn up in chapter 3, were tested by conducting several multiple hierarchical linear regression analyses. First, hypotheses 1A and 3A were tested. The dependent variable for H1A was attitudinal ambivalence, while the dependent variable for H3A was confirmation bias. The predictor variables for both H1A and H3A are similar: Congruency, attitude-strengths, Interaction-effect (congruency*Att. Strength-traditional meat), Interaction-effect (congruency*Att. Strength-cultured meat).

Thereafter, hypotheses 1B, 2 and 3B were tested by conducting one hierarchical multiple linear regression analysis with post-attitude towards cultured meat as dependent variable. The predictor variables included in this analysis were: message-type, attitudinal ambivalence,

confirmation bias, prior-attitudes, Interaction (Message type with attitudinal ambivalence towards cultured meat), and the Interaction (Message type with attitudinal ambivalence towards traditional meat). Lastly, any interesting outcomes in relation to the background variables (food neophobia and education level) and other relevant findings were summarised.

4.6 Background variables

Lastly, two background variables which are expected to moderate attitude towards cultured meat will be discussed. These background variables are food neophobia and education level. Both are expected to be moderating factors to take into account in this study as well.

Food neophobia is likely to affect people's acceptance on cultured meat. The phenomenon appears to be a very complicated mindset. Its level of intensity fluctuates during the course of a person's life and is influenced by numerous factors (Faccio & Fovino, 2019). Research has shown that emotional considerations like food neophobia had a greater effect on consumer responses to cultured meat compared to rational considerations (Hamlin et al., 2022). Moreover, It has been demonstrated that food neophobia correlates negatively with people's reported desire to eat cultured meat (Bryant et al., 2019; Wilks et al., 2019). Siegrist & Hartmann (2020) found that food neophobia affected the acceptance of cultured meat of people in all ten countries that were investigated during their study. Food neophobia is particularly relevant for new food technologies that are not based on natural ingredients and do not have plant-based products as their main ingredients (Siddiqui et al., 2022), such as cultured meat.

Multiple studies in recent years have shown that education level moderates the acceptance towards cultured meat and will therefore be taken into consideration for this research as well. Higher levels of education are positively correlated with higher levels acceptance towards cultured meat (Van Loo et al., 2020; Wilks et al., 2019; Slade, 2018). These studies indicate that education level is an important predictor for acceptance and attitude towards cultured meat and will therefore be collected when collecting demographic characteristics of participants.

5. Results

5.1 Data screening

5.1.1 Reliability analysis

In total, seven constructs have been measured on their internal consistency by means of Cronbach's alpha analyses. The prior attitude towards cultured meat-scale is reliable (4 items; $\alpha = .938$). The prior attitude towards traditional meat-scale is reliable as well (4 items; $\alpha = .954$). Furthermore, the attitude strength-scale concerning cultured (3 items; $\alpha = .431$). and traditional meat (3 items; $\alpha = .343$) were not reliable in first instance. However, by removing the item "*How much mental effort did you put into evaluating cultured meat/traditional meat?*", both the attitude strength-scale for cultured meat (2 items; $\alpha = .782$) and traditional meat (2 items; $\alpha = .658$) became substantially more reliable. Therefore this item has been left out in the remainder of the analysis. The post-attitude towards cultured meat scale (4 items; $\alpha = .948$) and food neophobia scale (3 items; $\alpha = .752$) are reliable as well.

5.1.2 Construction of variables and recoding

Before conducting the analyses, the averages of all variables comprised of multiple items were computed in order to create the constructs as outlined in chapter 4.3. The four messages were encoded into dummy variables to represent the main effects: D1 for cultured meat (-1) versus traditional meat (1), and for D2 for approach (1) versus avoidance (-1). Additionally, D3 (D1*D2) was created in order to incorporate the interaction effect between D1 and D2. Hereby, the effect of the control and main experimental conditions were separated. An alternative parameterising has also been conducted, as D1 for avoidance in relation to cultured meat and approach in relation to traditional meat(0), D2 for avoidance in relation to traditional meat (-1), and D3 for approach in relation to cultured meat (1). This in order to discover the different effects between the main conditions on post-attitude towards cultured meat.

5.1.3 Descriptives

A total of 257 respondents participated in this study. However, after the screening process assessing their familiarity and knowledge in relation to cultured meat, 182 respondents (N = 182) were eligible to complete the survey. Table 3 displays the means and standard deviations of the main and background variables across different conditions. There were no randomisation errors in participants' prior-attitude towards cultured or traditional meat between the conditions. However, it should be mentioned that the majority of participants is rather highly educated as the overall average education level (M = 5.24), which approximately corresponds with having attained a bachelor at WO or HBO level.

The mean prior-attitude toward traditional meat with in the 'positive message on cultured meat' condition appears to be notably lower compared to the other groups (M = 2.81). Nevertheless, there is no statistically significant distinction between the groups with respect to prior-attitude towards traditional meat ($F(3,179) = 2.265, p = .083$) or cultured meat ($F(3,179) = .373, p = .772$) as determined by an one-way ANOVA. Conversely, statistically significant differences did emerge among the groups regarding congruency ($F(3,179) = 10.976, p < .001$), attitudinal ambivalence concerning cultured meat ($F(3,179) = 4.222, p = .007$), and confirmation bias related to cultured meat ($F(3,179) = 2.774, p = .043$). Furthermore, a near-statistically significant difference between the groups emerges with regards to post-attitude towards cultured meat ($F(3,179) = 2.579, p = .055$). Additionally, table 4 shows the noteworthy observation that more women (62.8%) took part in this study compared to their male counterparts (36.1%).

Table 3: Means and standard deviations of main and background variables divided into the four different groups: 'Mean (standard deviation)'. * = $p < 0.05$, ** = $p < 0.01$, * $p = < 0.001$. F-value (DF)**

	Cultured meat		Traditional meat		F – values (179)
	Positive message (+)	Negative message (-)	Positive message (+)	Negative message (-)	
Main variables					
1. Prior-attitude cultured meat	4.97 (1.13)	4.91 (1.39)	4.78 (1.63)	4.69 (1.40)	0.37
2. Prior-attitude traditional meat	2.81 (1.48)	3.55 (1.46)	3.29 (1.52)	3.51 (1.61)	2.27
3. Congruency	5.09 (1.41)	4.26 (1.35)	3.60 (1.63)	5.14 (1.61)	10.98***
4. Attitude-strength cultured meat	4.38 (1.21)	4.42 (1.28)	4.32 (1.22)	3.94 (1.47)	1.38
5. Attitude-strength traditional meat	4.54 (1.38)	4.71 (1.13)	4.58 (1.25)	4.61 (1.42)	0.13
6. Attitudinal ambivalence cultured meat	3.89 (1.43)	4.98 (1.34)	4.53 (1.60)	4.65 (1.55)	4.22**
7. Attitudinal ambivalence traditional meat	4.41 (1.80)	4.19 (1.75)	3.91 (1.72)	4.55 (1.90)	1.12
8. Confirmation bias traditional meat	0.40 (0.29)	0.44 (0.26)	0.42 (0.27)	0.46 (0.24)	0.50
9. Confirmation bias cultured meat	0.49 (0.32)	0.63 (0.24)	0.63 (0.24)	0.59 (0.23)	2.77*
10. Post-attitude cultured meat	4.93 (1.20)	4.20 (1.23)	4.31 (1.54)	4.65 (1.57)	2.58
Background variables					
1. Education level	5.17 (0.984)	5.35 (0.95)	5.38 (0.98)	5.06 (1.13)	1.00
2. Age	38.48 (15.33)	45.02 (19.06)	43.71 (20.43)	45.31 (18.59)	1.37
3. Food neophobia	2.53 (1.07)	2.56 (1.19)	2.47 (0.98)	2.42 (1.28)	0.13

Table 4: Crosstabulation of gender in combination with the four different conditions

	Cultured meat positive (+)	Cultured meat negative (-)	Traditional meat positive (+)	Traditional meat negative (-)	Total
Male	15 (8.2%)	16 (8.7%)	15 (8.2%)	20 (10.9%)	66 (36.1%)
Female	31 (16.9%)	26 (22.6%)	29 (15.8%)	29 (15.8%)	114 (62.8%)
Other / prefer not to say	0 (0%)	1 (0.5%)	1 (0.5%)	0 (0%)	2 (1.1%)
Total	46 (25.1%)	43 (23.5%)	45 (24.6%)	49 (26.8%)	182 (100%)

5.1.4 Correlation analysis

Table 5 indicates statistically significant correlations between the variables. The Pearson-correlation analysis indicates a significant positive correlation between post-attitude towards cultured meat and congruency ($r = .201$; $p = .006$). Next to that, Prior-attitude towards cultured meat strongly and significantly correlates with post-attitude towards cultured meat ($r = .780$; $p = <.001$). In addition, the Pearson-correlation indicates a strongly significant negative correlation between prior attitude towards traditional meat and post-attitude towards cultured meat ($r = -.407$; $p = <.001$), and between prior attitude towards traditional meat and prior-attitude towards cultured meat ($r = -.462$; $p = <.001$). Furthermore, food neophobia and prior-attitude towards traditional meat correlate significantly positive ($r = .242$; $p = <.001$).

Attitudinal ambivalence in relation to traditional meat and post-attitude towards cultured meat correlate significantly positive with each other ($r = 1.60$; $p = 0.031$). Additionally, attitudinal ambivalence in relation to cultured meat has highly significant negative correlations with post-attitude towards cultured meat ($r = -.590$; $p = <.001$) and with prior-attitude towards cultured meat ($r = -.406$; $p = <.001$). In the contrary, Attitudinal ambivalence in relation to cultured meat is correlated positively and highly significant with prior attitude towards traditional meat ($r = .312$; $p = <.001$).

Further, attitude-strength in relation to traditional meat correlates negatively and highly significant with attitudinal ambivalence in relation to traditional meat ($r = -.256$; $p = <.001$). Attitude-strength in relation to cultured meat correlates significantly positive with post-attitude towards cultured meat ($r = .246$; $p = <.001$), prior-attitude towards cultured meat ($r = .231$; $p = .002$) and attitude strength towards traditional meat ($r = .402$; $p = <.001$). Furthermore, attitude-strength towards cultured meat correlates significantly negative with attitudinal ambivalence in relation to cultured meat ($r = -.286$; $p = <.001$).

Table 5: Table indicating Pearson correlations between variables. **. Correlation is significant at the 0.01 level. * Correlation is significant at the 0.05 level. (2-tailed).

Variables	Congruency	Post-attitude cultured meat	Prior-attitude cultured meat	Prior-attitude traditional meat	Food-Neophobia	Attitudinal ambivalence traditional meat	Attitudinal ambivalence cultured meat	Attitude-strength traditional meat	Attitude-strength cultured meat	Confirmation bias traditional meat
Post-attitude cultured meat	.201**									
Prior-attitude cultured meat	.091	.780**								
Prior-attitude traditional meat	-.056	-.407**	-.462**							
Food Neophobia	-.041	-.113	-.130	.242**						
Attitudinal ambivalence traditional meat	.062	.160*	.135	-.066	-.029					
Attitudinal ambivalence Cultured meat	-.123	-.590**	-.406**	.312**	.018	-.017				
Attitude-strength traditional meat	-.061	-.065	-.002	-.064	.013	-.256**	-.007			
Attitude-strength cultured meat	-.007	.246**	.231**	-.120	.037	.037	-.286**	.402**		
Confirmation bias traditional meat	.010	-.237**	-.219**	.452**	-.067	-.161*	.198**	-.064	-.098	
Confirmation bias cultured meat	-.097	-.315**	-.273**	.177*	-.140	.044	.341**	.080	-.125	.213**

5.2 Testing of hypotheses

5.2.1 Moderation effect of attitude-strength on relation between congruency and attitudinal ambivalence (H1A)

To investigate H1A, which states that stronger attitudes weaken the influence of congruency on attitudinal ambivalence, two hierarchical multiple linear regression analysis were conducted. Table 6 and table 7 show the coefficients related to these analyses. In order to address the issue of multicollinearity, grand mean centring has been applied to the predictor variables in both analyses. Firstly, the statistics as depicted in table 6 will be elaborated on.

Attitudinal ambivalence towards cultured meat

As shown below table 6, model 1 ($F(3, 179) = 7.385, p = <.001$) and model 2 ($F(5, 177) = 4.978, p = <.001$) both exhibit significance. However when examining the significance level of F-change for model 2 ($p = .268$), it can be concluded that the two added interaction effects do not make a significant contribution to explaining additional variance in the model.

Table 6 presents the coefficients table for the hierarchical multiple linear regression analysis. The predictor variables: congruency, attitude-strength (traditional meat), and attitude-strength (cultured meat) were measured on attitudinal ambivalence towards cultured meat as the dependent variable. Only the direct effect of attitude-strength (cultured meat) was found to be a significant predictor of attitudinal ambivalence towards cultured meat ($t(177) = -4.515, p = <.001$). This means that stronger attitudes (cultured meat) are associated with lower levels attitudinal ambivalence towards cultured meat. In other words, attitude-strength (cultured meat) and attitudinal ambivalence towards cultured meat have a significant negative linear relationship.

Model 2 of this analysis reveals that the interaction effect of attitude-strength (cultured meat) and congruency on attitudinal ambivalence towards cultured meat did not reach statistical significance ($t(177) = -1.276, p = .204$). Similarly, the interaction effect of attitude-strength (traditional meat) and congruency on attitudinal ambivalence towards cultured meat was clearly non-significant as well ($t(177) = -0.272, p = .786$).

In conclusion, The interaction effects between congruency and both attitude-strength (cultured meat) and attitude-strength (traditional meat) were not found to significantly impact attitudinal ambivalence towards cultured meat. This means that no evidence was found that attitude-strength operates as a moderator between congruency and attitudinal ambivalence towards cultured meat. Based on these findings, it does not seem likely that stronger attitudes weaken the influence of congruency on attitudinal ambivalence towards cultured meat.

Table 6: Attitudinal ambivalence towards cultured meat

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	4.508	0.107		42.019	<.001
	Congruency	-0.115	0.066	-.122	-1.729	.086
	Attitude-strength (traditional meat)	0.141	0.091	.120	1.552	.123
	Attitude-Strength (cultured meat)	-0,392	0.090	-.335	-4.344	<.001
2	(Constant)	4.505	0.107		41.994	<.001
	Congruency	-0.098	0.067	-.104	-1.457	.147
	Attitude-strength (traditional meat)	0.148	0.091	.126	1.629	.105
	Attitude-Strength (cultured meat)	-0.413	0.092	-.353	-4.515	<.001
	Interaction-effect (congruency*Att. Strength-traditional meat)	-0.014	0.053	-.022	-0.272	.786
	Interaction-effect (congruency*Att. Strength-cultured meat)	-0.073	0.057	-.105	-1.276	.204
Model 1: F = 7.385		F-change = 7.385	Sig. F-change = <.001			
Model 2: F = 4.978		F-change = 1.327	Sig. F-change = .268			

Attitudinal ambivalence towards traditional meat

As indicated below table 7, model 1 ($F(3, 179) = 4.348, p = .006$) and model 2 ($F(5, 177) = 2.604, p = .027$) both show significance. However when examining the significance level of F-change for model 2 ($p = .945$), it becomes evident that the two additional interaction effects do not make a significant contribution to explaining additional variance in the model.

In table 7 the coefficient table for the hierarchical multiple linear regression analysis is presented. The predictor variables: congruency, attitude-strength (traditional meat), and attitude-strength (cultured meat) were assessed concerning their impact on attitudinal ambivalence towards traditional meat as the dependent variable. Among these predictors, only the direct effect of attitude-strength (traditional meat) was discovered to be a significant predictor of attitudinal ambivalence towards traditional meat ($t(177) = -3.099, p = .002$). This implies that stronger attitudes (traditional meat) can be linked with lower levels of attitudinal ambivalence towards traditional meat. In conclusion, there is significant negative linear relationship between attitude-strength (traditional meat) and attitudinal ambivalence towards traditional meat.

Model 2 of this analysis reveals that the interaction between attitude-strength (cultured meat) and congruency on attitudinal ambivalence towards traditional meat did not achieve statistical significance ($t(177) = -.0198, p = .844$). Similarly, the interaction effect of attitude-strength (traditional meat) and congruency on attitudinal ambivalence toward cultured meat was clearly non-significant either ($t(177) = 0.332, p = .740$).

To summarise, the interaction effects between congruency and both attitude-strength (cultured meat) and attitude-strength (traditional meat) were not found to significantly impact attitudinal ambivalence towards traditional meat. Therefore, no evidence was found that attitude-strength operates as a moderator between congruency and attitudinal ambivalence towards traditional meat. Based on these findings, it does not seem likely that stronger attitudes weaken the influence of congruency on attitudinal ambivalence towards traditional meat.

Table 7: Attitudinal ambivalence towards to traditional meat

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	4.273	0.129		33.027	<.001
	Congruency	0.054	0.080	.049	0.672	.503
	Attitude-strength (traditional meat)	-0.345	0.110	-.249	-3.149	.002
	Attitude-Strength (cultured meat)	-0.015	0.109	-.011	-0.134	.894
2	(Constant)	4.276	0.130		32.814	<.001
	Congruency	0.053	0.081	.048	0.648	.518
	Attitude-strength (traditional meat)	-0.343	0.111	-.247	-3.099	.002
	Attitude-Strength (cultured meat)	-0.018	0.111	-.013	-0.166	.868
	Interaction-effect (congruency*Att. Strength-traditional meat)	0.021	0.064	.028	0.332	.740
	Interaction-effect (congruency*Att. Strength-cultured meat)	-0.014	0.069	-.017	-0.198	.844
Model 1: F = 4.348		F-change = 4.348	Sig. F-change = .006			
Model 2: F = 2.604		F-change = .056	Sig. F-change = .945			

Conclusion H1a

The overall conclusion of chapter 5.2.1 should therefore be that it does not seem that stronger attitudes weaken the influence of congruency on attitudinal ambivalence towards either traditional or cultured meat in the context of this study. Therefore, H1A has not been proven. Nevertheless, evidence was found that attitude-strength (cultured-meat) has a significant negative linear relationship with attitudinal ambivalence towards cultured meat, while attitude-strength (traditional meat) has a significant negative linear relation with attitudinal ambivalence towards traditional meat.

5.2.2 Moderation effect of attitude-strength on relation between congruency and confirmation bias (H3A)

To assess H3A, stating that participants with strong attitudes and low congruency between their prior-attitude and the provided message are highly susceptible to confirmation bias, two hierarchical multiple linear regression analysis were conducted (table 8 and table 9). Again, grand-mean centring was applied to address multicollinearity for both analyses with dependent variables confirmation towards traditional meat and confirmation bias towards cultured meat. Firstly, we will discuss the results as shown in table 8.

Confirmation bias towards cultured meat

As shown in table 8, both model 1 ($F(3, 179) = 2.727, p = .046$) and model 2 ($F(5, 177) = 2.945, p = .014$) show statistical significance. This suggests that at least one predictor variable in each of the 2 models is significantly associated with confirmation bias towards cultured meat. In addition, adding the two interaction variables in model 2 seems to improve the model, as the significance of F-change: $p = .044$.

It appears from the coefficients of model 1 in table 8 that, attitude-strength (cultured meat) is the only significant predictor of confirmation bias towards cultured meat ($t(179) = -2.324, p = .021$) among all predictors; congruency, attitude-strength (traditional meat), and attitude-strength (cultured meat). The obtained negative t-value indicates a significant inverse association between attitude-strength (cultured meat) and confirmation bias towards cultured meat. This finding is noteworthy because it partially contradicts H3A, suggesting that an increase in attitude-strength (cultured meat) is linked to a decrease in confirmation bias towards cultured meat. Attitude-strength (traditional meat) is close to reaching statistical significance in model 1 ($t(179) = 1.865, p = .064$), and has a positive linear relation with confirmation bias towards cultured meat.

Model 2 has a higher explanatory power than model 1, which means that including the interaction terms improves the model's ability to explain confirmation bias towards cultured meat. In addition, Attitude-strength (traditional meat) becomes significant in model 2 ($t(177) = 2.011, p = .046$), suggesting that stronger attitudes towards traditional meat are positively associated with increased confirmation bias towards cultured meat.

Furthermore, Attitude-strength (cultured meat) increases in significance compared to model 1 as well ($t(177) = -2.867, p = .008$). Importantly to note as well, is that the interaction effect between attitude-strength (cultured meat) and congruency reaches significance ($t(177) = -2.034, p = .043$). This indicates that the relation between congruency and confirmation bias towards cultured meat depends on the strength of attitude-strength (cultured meat). Additionally, this interaction effect has a negative linear relation with confirmation bias toward cultured meat. This means that when attitude-strength (cultured meat) increases, the effect of (in)congruency on confirmation bias towards cultured meat becomes weaker.

Table 8: Confirmation bias towards cultured meat

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	0.585	0.019		30.415	<.001
	Congruency	-0.014	0.012	-.089	-1.216	.226
	Attitude-strength (traditional meat)	0.030	0.016	.149	1.865	.064
	Attitude-Strength (cultured meat)	-0.038	0.016	-.186	-2.324	.021
2	(Constant)	0.584	0.019		30.690	<.001
	Congruency	-0.010	0.012	-.061	-.827	.409
	Attitude-strength (traditional meat)	0.032	0.016	.160	2.011	.046
	Attitude-Strength (cultured meat)	-0.044	0.016	-.216	-2.687	.008
	Interaction-effect (congruency*Att. Strength-traditional meat)	-0.003	0.009	-.027	-.321	.749
	Interaction-effect (congruency*Att. Strength-cultured meat)	-0.021	0.010	-.172	-2.034	.043
Model 1: F = 2.727		F-change = 2.727		Sig. F-change = .046		
Model 2: F = 2.945		F-change = 3.173		Sig. F-change = .044		

Confirmation bias towards traditional meat

When examining table 9, it becomes evident that both model 1 ($F(3, 179) = 0.625, p = <.001$) and model 2 ($F(5, 177) = 0.558, p = .732$) are not statistically significant, indicating that just a small proportion of the variance in confirmation bias towards cultured meat is explained by the predictor variables: congruency, attitude-strength (cultured meat), and attitude strength (traditional meat). In model 2, the interaction effects between congruency and attitude-strength (cultured meat) and the interaction effect between congruency and attitude-strength (traditional meat) have been added. However, the output in table 8 shows that the addition of these two interaction effects certainly do not improve the model as the significance of F-change is extremely low ($p = .630$).

Furthermore, the coefficients table (table 8) indicates that the only significant p -value is the constant. ($p = <.001$). This indicates that there is a significant level of confirmation bias towards traditional meat without any predictor variables. Both model 1 and 2 do not show any other significant predictor variables, meaning none of the included predictors in model 1 and model 2 have a statistically significant relationship with confirmation bias towards traditional meat.

To summarise; H3A cannot be supported in the context of confirmation bias towards traditional meat. None of the predictors or the interaction effects appear to have a significant impact on confirmation bias towards traditional meat. Additionally, the R-squared values for both model 1 ($R^2 = .010$) and model 2 ($R^2 = .016$) appear to be extremely low, suggesting that the predictors explain only a minimal amount of the variance in confirmation bias towards traditional meat.

Table 9: Confirmation bias towards traditional meat

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	0.432	0.020		22.061	<.001
	Congruency	0.002	0.012	.010	0.128	.899
	Attitude-strength (traditional meat)	-0.006	0.017	-.029	-0.350	.726
	Attitude-Strength (cultured meat)	-0.017	0.016	-.086	-1.062	.290
2	(Constant)	0.431	0.020		21.912	<.001
	congruency	0.003	0.012	.020	0.265	.791
	Attitude-strength (traditional meat)	-0.006	0.017	-.028	-0.346	.730
	Attitude-Strength (cultured meat)	-0.018	0.017	-.091	-1.096	.275
	Interaction-effect (congruency*Att. Strength-traditional meat)	-0.006	0.010	-.057	-0.665	.507
	Interaction-effect (congruency*Att. Strength-cultured meat)	-0.003	0.010	-.025	-0.288	.773
Model 1: F = .625		F-change = .625	Sig. F-change = .600			
Model 2: F = .558		F-change = .630	Sig. F-change = .630			

Conclusion H3A

For confirmation bias towards cultured meat, weaker attitudes seem to be associated with higher confirmation bias, already partly opposing the reasoning of H3A. In the contrary, table 8 also shows evidence for a positive linear relation between attitude-strength (traditional meat) and confirmation bias towards cultured meat. Meaning that when an individual's attitude towards traditional meat strengthens, their susceptibility to confirmation bias towards cultured increases.

As mentioned in the previous paragraph, the interaction effect between congruency and attitude-strength (cultured meat) is significant, and has negative linear relationship with confirmation bias towards cultured meat. This would imply that the relationship between congruency and attitude-strength (cultured meat) has a moderating effect on confirmation bias towards cultured meat. Specifically, the negative relation implies that when there is low congruency between prior-attitude and the provided message about cultured meat, participants adopting strong-attitudes (cultured meat) are less susceptible to experiencing confirmation bias. In practical terms, this shows that individuals holding a strong attitude with regards to cultured meat are less susceptible to experiencing confirmation bias towards cultured meat than individuals holding weaker attitudes towards cultured meat.

Although it has been shown that the relationship between congruency and confirmation bias towards cultured meat is not similar for individuals with different levels of attitude-strength(cultured meat), and that attitude-strength (traditional meat) and confirmation bias towards cultured meat have a significant linear and positive relationship, H3A cannot be

entirely proven. It has not been shown that participants with strong attitudes and low congruency between their prior-attitude and the provided message are highly susceptible to confirmation bias. However, it has been shown that there is a moderation effect, where attitude-strength (cultured meat) changes the nature of the relationship between congruency and confirmation bias towards cultured meat.

5.2.3 Main regression analysis (H1B, H2 and H3B)

In order to discover the main effects concerning this study, a hierarchical multiple linear regression analysis has been conducted, with post-attitude towards cultured meat as dependent variable. In this chapter H1B, H2 and H3B will be tested. The results of this analysis can be found in table 10.

Model summary

For both model 1 ($F(9, 173) = 50.486, p = <.001$) and model 2 ($F(9, 173) = 42.627, p = <.001$) a significant portion of the variance was explained by the predictor variables. However, the addition of the two interaction effects between attitudinal ambivalence and type of message does not seem to improve the model significantly as the significance of F-change is $p = .068$.

H1B: Attitudinal ambivalence and susceptibility to attitude change

H1B states that participants high in attitudinal ambivalence are expected to be more susceptible to attitude change by the type of information provided by them in this study. To test this hypothesis, the effect-coding of the message-types were reparametrized into: simple effects of the positive/negative message given that it is cultured meat, and into: simple effects of the positive/negative message given that is traditional meat. This approach makes it possible to distinguish between people's attitudinal ambivalence on cultured meat and their attitudinal ambivalence on traditional meat. Subsequently, interaction effects were made for attitudinal ambivalence towards cultured meat and type of message, and for attitudinal ambivalence towards traditional meat and type of message. In order to correct for multicollinearity, grand-mean centring has been applied to attitudinal ambivalence towards both cultured and traditional meat.

In order to evaluate H1B, the focus should be on the interaction effects as just described. When examining the regression coefficients as depicted in table 10, it becomes evident that the interaction between attitudinal ambivalence towards traditional meat and the message-type is statistically significant ($t(171) = -2.182, p = .030$). However the interaction between attitudinal ambivalence towards cultured meat and type of message is not statistically significant ($t(171) = -.775, p = .439$). Therefore, it can be concluded that individuals high in attitudinal ambivalence towards traditional meat are more susceptible to attitude change by the type of information provided in this study. However, this reasoning does not apply for individuals high in attitudinal ambivalence towards cultured meat. To conclude, H1B is confirmed for attitudinal ambivalence in relation to traditional meat but not in relation to cultured meat. Thus, H1B can only be partially supported based on the findings of this study.

H2: The effect of attitudinal ambivalence towards cultured meat on its acceptance

H2 suggests that high levels of attitudinal ambivalence towards cultured meat will negatively impact its acceptance. The Coefficients table of the regression analysis as presented in table 10 reveals that attitudinal ambivalence towards cultured meat is highly significant ($t(171) = -6.664, p = <.001$). Furthermore, its negative t-value indicates an inverse linear relationship with post-attitude towards cultured meat. This implies that when an individual holds a higher degree of attitudinal ambivalence towards cultured meat, it is more probable that their post-attitude towards cultured meat will be relatively lower. On this basis, H2 can be confirmed. Higher levels of attitudinal ambivalence towards cultured meat will negatively impact its acceptance.

H3B: The effect of confirmation bias on acceptance of presented information

H3B claims that participants experiencing confirmation bias in this study are more likely to express a negative post-attitude towards cultured meat. As shown in table 10, both confirmation bias towards traditional meat ($t(171) = -0.648, p = .518$) and confirmation bias towards cultured meat ($t(171) = -1.03, p = .918$) do not show statistical significance. Therefore, H3B should be rejected. It has not been shown that participants experiencing confirmation bias in this study are more likely to express a negative post-attitude towards cultured meat.

Table 10: Main regression analysis on post-attitude towards cultured meat as dependent variable

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.480	0.436		5.688	<.001
Attitudinal ambivalence (traditional meat)	0.037	0.033	.047	1.135	.258
Attitudinal ambivalence (cultured meat)	-0.278	0.044	-.299	-6.384	<.001
Confirmation bias (traditional meat)	-0.181	0.248	-.034	-.0731	.466
Confirmation bias (cultured meat)	-0.078	0.239	-.015	-0.327	.744
Prior-attitude (cultured meat)	0.665	0.050	.653	13.314	<.001
Prior-attitude (traditional meat)	0.015	0.047	.016	0.326	.745
Message-type (cultured meat w traditional meat)	0.051	0.057	.036	0.887	.376
Message-type (negative w positive)	-0.009	0.059	-.006	-0.155	.877
Message-type (Interaction effect)	-0.199	0.059	-.140	-3.363	<.001
(Constant)	2.408	0.433		5.561	<.001
Attitudinal ambivalence (traditional meat)	0.031	0.033	.039	0.937	.350
Attitudinal ambivalence (cultured meat)	-0.289	0.043	-.311	-6.64	<.001
Confirmation bias (traditional meat)	-0.160	0.247	-.030	-0.648	.518
Confirmation bias (cultured meat)	-0.024	0.237	-.005	-0.103	.918
Prior-attitude (cultured meat)	0.674	0.051	.662	13.301	<.001
Prior-attitude (traditional meat)	0.026	0.046	.028	0.560	.576
Message-type (cultured meat vs traditional meat)	0.046	0.059	.033	-0.88	.432
Message-type (negative vs positive)	-0.013	0.058	-.009	-0.222	.825
Message-type (Interaction effect)	-0.202	0.059	-.142	-3.438	<.001

Interaction (Message type w attitudinal ambivalence towards cultured meat)	-0.047	0.060	-0.033	-.775	.439
Interaction (Message type w attitudinal ambivalence towards traditional meat)	-0.098	0.045	-0.090	-2.182	.030
<hr/>					
Model 1: F = 50.486	F-change = 50.486	Sig. F-change = <.001			
Model 2: F = 42.627	F-change = 2.726	Sig. F-change = .06			

5.2.4 Background variables and other findings

Both background variables food neophobia and education level did not show a significant relationship with post-attitude towards cultured meat and have therefore not been included in this analysis. Furthermore, message type has a significant linear relationship with post-attitude towards cultured meat ($t(179) = -3,438$, $p = <.001$), indicating that the positive message on cultured meat and the negative message on traditional meat yielded relatively more positive post-attitude towards cultured meat, as expected. No significant difference was found between the effect of the positive message on cultured meat in comparison with the negative message on traditional meat, and have therefore not been included in this analysis.

6. Conclusion and discussion

In the preceding chapters, a series of regression analyses were conducted in order to test the hypotheses related to the moderation effect of attitude-strength (cultured and traditional meat) on the relationship between congruency, attitudinal ambivalence and confirmation bias. Subsequently a main regression analysis with post-attitudes towards cultured meat as dependent variable was performed, examining the relationship between attitudinal ambivalence, confirmation bias, prior-attitude and message-type and the post-attitude towards cultured meat. This section summarises the findings and draw more in-depth conclusion on the results and key-findings in the context of the hypotheses as drawn up in the theoretical framework (chapter 3). Furthermore, we will refer back to the research questions and aim. Thereafter, practical implications of these finding for the industry will be discussed. And lastly, the limitations of this study and suggestions for future research are considered.

This study has provided insights into the complex relationships between attitude-strength, (in)congruency, different types of communicating cultured/traditional meat, attitudinal ambivalence, and confirmation bias in the context of cultured meat acceptance. While the findings did not yield all of the expected results, there were several notable findings in relation to the hypotheses. These are further elaborated below.

In the case of H1A, which examined the moderation effect of attitude-strength on the relationship between congruency and attitudinal ambivalence, the results imply that stronger attitudes do not significantly weaken the influence of congruency on attitudinal ambivalence, whether it is towards traditional or cultured meat. Therefore, H1A has not been proven in the context of this study. Attitude-strength, towards either cultured or traditional meat, does not operate as a moderator in the relationship between congruency and attitudinal ambivalence. No other studies were found that prove this exact relationship either.

However, the regression analyses performed to test this H1A, did reveal an interesting nuance. Although attitude-strength did not act as a moderator in the relationship between congruency and attitudinal ambivalence, it was found that stronger attitudes toward a specific meat type (e.g. traditional meat) were linked to lower ambivalence regarding that type of meat (e.g. traditional meat). In other words; a significant negative linear relationship between attitude-

strength and attitudinal ambivalence was found. This finding is not very unexpected or striking; it aligns with our expectations and previous studies on the relation between ambivalence and attitude strength. These studies claim that ambivalent attitudes are basically a form of weak attitudes (Armitage & Conner, 2000; Brückner et al., 2004; Costarelli & Colloca, 2006). When someone possesses a strong attitude, it is less common for them to simultaneously hold both positive and negative views toward a specific construct. In cases of strong attitudes, their sentiment is rather firmly leaned toward either a positive or negative direction.

However, it should be mentioned that attitudinal ambivalence is nowadays not commonly understood as just a trait of attitude-strength, but rather as a trigger for individuals to engage in strategies that reconcile inconsistencies in attitudes. The reconciliation of inconsistent attitudes is actually associated with greater systematic processing and cognitive effort, which is often rather associated with strong, rather than weak attitudes (Van Harreveld et al. 2015). Therefore, it cannot be bluntly claimed that higher levels of ambivalence towards cultured meat are automatically associated with weaker attitudes and limited cognitive effort.

H1B posited that participants high in attitudinal ambivalence would be more susceptible to attitude change based on the type of information provided. This hypothesis could only be partially supported in this study. Attitudinal ambivalence towards traditional meat has shown to be a significant moderator on the relationship between type of message and post-attitude towards cultured meat, meaning that individuals who experience this are more prone to attitude change. This partly supports the findings in study by Berndsen and Van Der Pligt (2004) on ambivalence in relation to meat. They found that ambivalent meat eaters are more open to change their meat consumption than less ambivalent meat eaters. Additionally, a study by Pittman et al. (2021) suggests that individuals who experience ambivalence towards a certain topic may have more malleable attitudes than those who do not.

However, it is crucial to note that no significant moderation effect for attitudinal ambivalence towards cultured meat was found on the relationship between the provided message and post-attitude towards cultured meat. It is not clear what the cause of this contrast is. A possible explanation might relate to the difference in familiarity with and content knowledge people have on cultured and traditional meat. In general, people are more familiar to traditional than cultured meat.

In contrast, A study by Wallace et al. (2019) would contradict this reasoning. They found that when people feel knowledgeable and familiar about something (e.g. traditional meat) and experience attitudinal ambivalence as well, their attitudes are less likely to change because of their mixed feelings. On the other hand, when people feel less knowledgeable on a certain topic (e.g. cultured meat) and experience attitudinal ambivalence at the same time, attitudinal ambivalence actually has a larger impact on attitude change. In conclusion, it remains unsure why attitudinal ambivalence towards traditional meat is a significant moderator in this particular study, while attitudinal ambivalence towards cultured meat is not.

The results were rather straightforward for H2, and robustly supported it. This hypothesis suggested that high levels of attitudinal ambivalence towards cultured meat would negatively impact its acceptance. From the main regression analysis in chapter 5.2.3, it indeed appeared that high levels of attitudinal ambivalence towards cultured meat are associated with a more negative post-attitude towards cultured meat. This underscores the important role that attitudinal ambivalence plays in shaping consumer attitudes towards cultured meat. As indicated by Harreveld et al. (2009), attitudinal ambivalence often comes along with negative affect and discomfort. This might have a causal relationship with the more negative attitudes that people have towards cultured meat and simultaneously have ambivalent attitudes towards it. According to a literature review by Kouarfaté en Durif (2023), attitudinal ambivalence

towards cultured meat stems from the following four types of ambivalence: ethics, intrinsic, informational and belief.

However, it is an important disclaimer that should be mentioned is that individuals with weaker attitudes show substantial weaker relationships between their attitudes and intentions (or attitude and behaviour) (Conner & Sparks, 2002). A study by Sparks et al. (2001), has proven this in the context of food choices as well. Therefore, it is still rather unpredictable whether individuals with higher levels of attitudinal ambivalence and more negative post-attitudes towards cultured meat will in fact show this in their intentions and behaviour.

H3A proposed that participants with strong attitudes and low congruency between their prior-attitude and the provided message are highly susceptible to confirmation bias. In other words, it reasons that attitude-strength will have a moderation effect on the relationship between congruency and confirmation bias. The findings offer some interesting insights into the dynamics between the formation of attitudes and confirmation bias towards cultured and traditional meat.

One unanticipated result that came out of the analysis for testing H3A, was the association between weaker attitudes in relation to cultured meat and higher confirmation bias towards cultured meat. This actually directly opposes the reasoning of this hypothesis. In the contrary to finding that participants with strong attitudes and low congruency between their prior attitude and the provided message would be highly susceptible to confirmation bias, it was found that when attitude-strength towards cultured meat increases, the impact of incongruency on confirmation bias towards cultured meat actually decreases.

Although this result is rather unexpected, a study by Sawicki et al. (2011), suggests that attitude-strength is not the sole predictor of confirmation bias. While strong attitudes typically lead individuals to seek out information that is attitude-consistent, Sawicki et al. (2011), also found that individuals who are uncertain about their attitudes are more likely to selectively expose themselves to information that aligns with their uncertain views. This tendency especially strengthens when the presented information is unfamiliar to them (as might be applicable to cultured meat).

Nevertheless, in line with H3A was the finding that attitude-strength in relation to traditional meat has a positive linear relationship with confirmation bias towards cultured meat. This suggests that when attitude-strength in relation to traditional meat is relatively high, individuals are more prone to selecting articles with negative headings on cultured meat. Furthermore, it should be mentioned that for confirmation bias towards traditional meat, no significant relations or moderation effects have been found in relation to attitude-strength towards either traditional or cultured meat.

In summary; H3A has only been partially proven in the context of this study. It has been shown that there is a nuanced dynamic between attitude-strength, congruency and confirmation bias. It appeared in this study that individuals with stronger attitudes were actually more resistant to experiencing confirmation bias. Additionally, it has been shown that the relation between congruency and confirmation towards cultured meat is dependent on attitude-strength towards cultured meat. In other words, attitude-strength towards cultured meat moderates the relation between congruency and confirmation bias in the context of cultured meat.

It was proposed in H3B that participants who experience confirmation bias are more likely to express a negative post-attitude towards cultured meat. This hypothesis was clearly not supported in the context of this study. Confirmation bias towards either traditional meat or cultured meat have not been proven to significantly influence an individual's post-attitude towards cultured meat. This result may imply that selective information processing towards

either traditional or cultured meat is not necessarily an important cue for forecasting attitudes towards cultured meat.

Instead, other cognitive/emotional processes might play a more crucial role in shaping these attitudes. For example fear and disgust, as described in a study by Wilks et al. (2021). In addition, the study by Hamlin et al. (2022) indicates that consumer reaction to cultured meat is rather influenced by affective than cognitive factors. On the other hand, it is essential to recognise that individuals possess varying levels of sensitivity to experiencing confirmation bias. This might have played a role in the non-significant findings as well. Next to this, the fact that the amount of articles to measure confirmation was reduced in this study, might also have had an influence on this result.

The coming paragraphs refer back to the main and sub-research questions, First of all, the first sub-questions was formulated as follows: "How do consumer's prior-attitudes regarding traditional and cultured meat and the type of message provided (negative vs. positive) affect post-attitude towards cultured meat." It became apparent in this research that consumer's prior-attitudes do indeed have a significant influence on their eventual attitudes towards cultured meat. More specifically, individuals possessing weaker attitudes towards cultured meat are more likely to obtain low levels of attitudinal ambivalence, which is subsequently associated with more negative post-attitudes towards cultured meat. Nevertheless, no such effect was not found for prior-attitudes towards traditional meat. On the other hand, the framing tactics (positive vs. negative) were not found to have significant impact on attitude change, as the interaction effects between the type of message and attitudinal ambivalence were not statistically significant. Also, there was no significant difference found between the effects of the messages shown in the main experimental conditions on attitude towards cultured meat.

The second sub-questions was formulated as: "How does the positive message regarding cultured meat affect individuals having a highly ambivalent attitude towards it?". From the results it appeared that the positive message regarding cultured meat did not obtain a significant impact on individuals who possessed highly ambivalent attitudes towards this concept. There was no statistically significant interaction effect found between attitudinal ambivalence towards cultured meat and the type of message. This simultaneously answers the third sub-question; "How does the avoid-message on traditional meat affect individuals having a highly ambivalent attitude towards cultured meat or traditional meat?". No statistically significant effect of message-type in relation to traditional meat and attitudinal ambivalence towards cultured meat was found.

The fourth and last sub-questions read as follows: "What role does confirmation bias play in the perception of the different message frames and how does this concept eventually affect consumer acceptance and attitude towards cultured meat?". The answer on this question is straightforward ;the presence of confirmation bias to either cultured or traditional meat did not have a significant impact on the perception of message frames or the lead to a significant change in post-attitudes towards cultured meat, in the context of this particular study.

The main research-question was: "How does the (in)congruency between individuals' prior-attitude towards traditional and cultured meat and the type of message provided (positive vs. negative) affect post-attitudes towards cultured meat?". On the basis of this study, It should be considered that the degree of congruency between type of message and prior-attitudes does affect post-attitudes towards cultured meat. Nevertheless, this effect is not uniform across all different constructs in this study. Based on this study, it can be stated that individuals holding strong prior-attitudes are less likely to experience either confirmation bias or attitudinal ambivalence. However, confirmation bias did not play an equally crucial role in this study compared to attitudinal ambivalence. For example, it appeared that individuals with high levels

of ambivalence towards traditional meat are expected to be more susceptible to attitude change by the provided message, while individuals with high ambivalence towards cultured meat have shown to not be prone to the same susceptibility of attitude change due to the message-type.

6.2 Limitations and future research

While this study has provided some valuable insights, it is essential to acknowledge its limitations, as described in the following paragraphs. First of all, confirmation bias has been measured by presenting the participants with six headings of news articles, of which three were positive and three were negative. First, six headings were shown to measure confirmation bias towards traditional meat of which three were clearly positive and three clearly negative. Thereafter, six were shown to measure confirmation bias words cultured meat, again with three clearly positive and three clearly negative news articles. In both cultured and traditional meat sections, two headings were on environmental sustainability, while two headings were on animal welfare. The remaining two headings were more neutral. However, as in this study both confirmation bias towards cultured meat and confirmation bias towards traditional meat were measured, the amount of headings were reduced from ten to six in total per construct. This was done to reduce the amount of reading for the participants. Hereby, the internal consistency of this study was slightly reduced. The same applies for the Food neophobia scale, which in this study consists of only three questions.

Furthermore, the construct 'uncertainty' was unintentionally excluded from this study, as the question intended to measure it was not included in the survey. It was initially planned to include uncertainty as a consequence of attitudinal ambivalence. However, it was shown that attitudinal ambivalence is a significant predictor of attitudes towards cultured meat. Former studies have already linked attitudinal ambivalence with uncertainty and other emotions negatively influencing attitudes (Clarkson et al., 2008; Harreveld et al. 2009; Luttrell et al., 2016). Therefore, the gravity of potential consequences of this mistake is limited.

Besides, due to the various interactions and numerous variables included, the study had to be divided into multiple regression analyses. This increases the probability of a type 1 error (False Positives). The more tests that are conducted, the higher the risk on a false positive results by chance. Further, convenience sampling was used to collect a sample group in this study. This sampling strategy can introduce selection bias, as it is not very likely to accurately represent the broader population. Also, the survey completed consisted of self-reported measures, which makes the probability of social desirability bias greater. And lastly, the language used in the messages could be seen as relatively long and complex. Therefore, several participants may not have fully understood or engaged with the messages. This could obviously impact the validity of this study.

This and other related studies have generated multiple opportunities for future studies. First of all, it is advised to conduct long-term consumer behaviour studies on the acceptance of cultured meat in order to track how attitudes towards cultured meat evolve over time. Longitudinal studies would contribute to gain more knowledge on how attitudes might change over time, as people become more familiar with cultured meat. Furthermore, it is advised to reexamine the influence of confirmation bias in relation to both traditional and cultured meat on attitudes towards cultured meat, while using the same method as used in the study by Meppelink et al. (2019) without reducing the number of articles, or use another validated measuring technique for confirmation bias. Next to this, it is recommended to discover how attitudinal ambivalence towards cultured meat exactly causes more negative attitudes towards cultured meat, as this has not been discovered in this particular study. Therefore, it should be researched what exact underlying mechanisms play a role in the particular context of cultured

meat acceptance. Lastly, future studies should focus more on which message-framing tactics are most successful per consumer segments on the acceptance of cultured meat.

6.3 Practical implications and final conclusion

Lastly, practical implications will be discussed. First and foremost, it has become evident by the results of this study that attitudinal ambivalence towards cultured meat should be reduced in order to create more positive attitudes it. By understanding what exactly underlies the attitudinal ambivalence towards cultured meat, the industry can develop targeted interventions to overcome ambivalence and thereby foster more positive attitudes. Addressing concerns on the production by providing information process that is accessible to the entire population in order to strengthen positive attitudes is necessary in order reduce attitudinal ambivalence. Furthermore, it has not been shown that confirmation bias has a significant effect on attitudes towards cultured meat. Still, it is essential for the industry to recognise the potential impact that confirmation bias could have. In the domain of consumer acceptance of cultured meat, this study reveals the complexity of underlying cognitive process such as attitude-strength, ambivalence, and confirmation bias. This points to the necessity for ongoing research in order to navigate this complex terrain. While not all expected results were obtained, several findings offer valuable insights for navigating the evolving landscape of cultured meat.

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