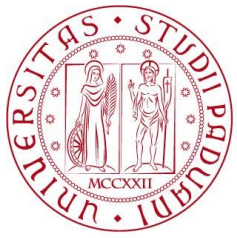

UNIVERSITÀ DEGLI STUDI DI PADOVA

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Department of Agronomy, Food, Natural Resources, Animals and Environment

Second Cycle Degree (Msc) In Italian Food and Wine – Alimenti e Vini d'Italia

The effect of psychological biases on Italian consumers' perception towards insect-based foods

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ABSTRACT

Consumer perceptions of insect-based foods play a vital role in shaping the future of sustainable protein sources. This study investigates the impact of psychological biases, including celebrity endorsements and social acceptance, on consumer attitudes toward insect-based foods. Through an examination of quality expectations, taste preferences, willingness to try and buy, and overall attitudes, this research provides a nuanced understanding of how external influences shape consumer perceptions.

Quality expectations are a critical determinant of consumer choices, and the study reveals that celebrity endorsements significantly influence consumers' quality expectations. Moreover, packaging aesthetics play a role in positive first impressions. Notably, when insects are visible on packaging, consumers tend to hold more negative quality expectations.

Taste preferences and appetizing levels present unique challenges for insect-based foods, especially in regions where insects are perceived as unappealing. However, once again, particularly celebrity endorsements, significantly impact participants' perceptions, making processed and raw insect products more palatable.

Willingness to try and buy insect-based products is directly tied to consumer behavior. Celebrity endorsements and social bias factors play a role in increasing consumer willingness to try insect-based foods, highlighting their potential in marketing campaigns. Nevertheless, the willingness to buy presents a more complex picture, with differing effects across social bias groups.

In the case of attitudes toward insect-based foods the changes were not as noticeable. There is a clear trend to the disagreement with negative statements. This indicates that altering people's established negative opinions about insects is more challenging than simply reducing their negativity towards insects to some extent.

Ultimately, this research provides valuable insights into the role of psychological biases in shaping consumer perceptions of insect-based foods, offering guidance for effective marketing and promotion initiatives in the pursuit of a more sustainable and resilient food system.

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Chapter 1

Introduction

In this Chapter, the background information, which forms the motivation and basis of this research as focused on the possible effects psychological biases can have on Italian consumers' perspective towards insect-based foods, is presented. Then, the objectives of the research are summarized. The significance of the research is explained afterward, followed by the research framework and overall organization of this thesis.

1.1 Research Background

As the world population grows larger, with an expectation of 9 billion people by 2050 (UN) the search for more sustainable alternative protein sources is of rising global interest. 30% of greenhouse gas (GHG) emissions are due to agriculture, including land usage, crop and livestock production (Tubiello et al., 2013). The population growth, the extreme environmental impact of raising animal protein, and the growing demand for high-protein products, have made government entities and producers involved in the research of new alternatives to satisfy the need. Consequently, novel foods such as cultured meat and insects are becoming emerging trends in European dietary habits. Insects are an unconventional protein source; however potential is starting to gain interest, especially to be used as a functional ingredient, in a form where the entire insect is not visible (Borges et al., 2023). This is mainly due to their multiple benefits; edible insects require no land clearing, emit fewer GHGs, and are healthy alternatives rich in protein, fats, and minerals (Huis, 2013a).

Nevertheless, despite overall awareness of the environmental and possible health benefits, and an approximate of 2 billion people around the world having edible insects in their regular diets, westerners still meet entomophagy with skepticism. Many cultural and psychological factors contribute to this resistance, such as food neophobia, eating habits, unfamiliarity, anxiety and fear. Psychological biases play an important role in consumer decision-making, and they can be used as a tool to create precise promotion of edible insects. All these aspects are discussed in greater detail in the literature review chapter of this thesis.

The influence of Italian cuisine in Europe and around the world makes this market a significant one to analyze when considering the introduction of a novel product. With Italy's passion and loyalty to their traditions and recipes, and meat's important role in Italian food culture, the acceptance of edible insects proves to be problematic. (Mancini & Antonioli, 2022). However, the successful acceptance of insect-based foods in Italy could potentially influence consumer perceptions and market trends in neighboring regions. Research can aid marketers and policymakers in tailoring marketing strategies and interventions to address their unique biases and preferences.

1.2 Research Objectives

For the successful integration of edible insects into the Western market it is essential to understand how consumers view entomophagy and how likely they are to accept it into their diets. Edible insects have been a part of the diet of many cultures around the world, but Westerners still meet it with contempt. Eating habits are hard to modify once established, and many factors come into play when consumers consider adopting new products into their food regimen. These factors and the role they play in food habits will be further discussed in the literature review chapter of this investigation. This study is focused on Italian consumers' opinions, mainly of the northern region of Italy.

The research aims to examine the impact of psychological biases on Italian consumers' perceptions and attitudes towards insect-based foods, exploring whether biases act as barriers or incentives for adopting insect-based foods. Furthermore, understanding the interplay between psychological biases and consumer perceptions of insect-based foods. To test this influence and reveal potential facilitators, individuals were presented with different articles that incorporate various social biases related to insect-based food consumption and were later asked to reply to a survey on their opinions on different products.

The research questions and corresponding hypotheses are as follows:

RQ1: Does psychological bias priming affect consumers' perception of insect-based food?

H1a: Exposure to psychological bias increases quality expectations for insect-based food

H1b: Exposure to psychological bias increases taste expectations for insect-based food

H1c: Individuals exposed to psychological bias find insect-based food more appetizing

RQ2: Does psychological bias priming influence people's willingness to buy and try insect-based foods?

H2a: Exposure to psychological bias increases willingness to try insect-based foods.

H2b: Exposure to psychological bias increases willingness to buy insect-based foods.

RQ3: To what extent does psychological bias priming affect people's attitudes towards novel foods?

H3a: No exposure to psychological bias is associated with dislike of the taste, smell, or texture of insects.

H3b: No exposure to psychological bias is associated with reluctance towards consuming insects.

H3c: Individuals exposed to psychological bias priming are more likely to like insects and eat them now and then.

1.3 Significance of Research

Western society is rapidly becoming more aware of the environmental toll that food production has on the planet. Consequently, this is raising the market demand for high-protein sustainable alternatives, and edible insects could be the answer. It is timely to research into consumers' opinions, expectations and reservations towards this otherwise unfamiliar food option in Western food culture. There has been a lot of research on the benefits of edible insects for the environment, health and even economically; highlighting the benefits and drawbacks of adopting insect-based foods into our diets. A lesser amount of research exists regarding how psychological biases can influence, incentivize, or, diminish, consumers' willingness to try and buy insect-based foods. To address this gap, the current research reviews available theories, analyzes situations, and collects data on the role psychological biases can have. Additionally, this research focuses particularly on the Italian consumer perspective, further intensifying the novelty of this investigation.

Italy is globally recognized for its cuisine and long-standing culinary traditions. Italians adhere to their recipes and methods and hold immense pride in doing so. For

them food is not just a means for substance, but part of their identity, heritage, and culture. Furthermore, Italians are known for their simplicity and selectiveness when choosing ingredients. All these characteristics create a bigger challenge for the introduction of insect-based foods into Italians' diets, as their food culture is strongly defined, which rarely allows for new foods or ingredients to be accepted. The Italian market is not yet ready to include insect-based foods in their diets. However, to know where to begin and how to approach this market, research is essential.

The insights into consumer behavior presented in this work can shed light on consumer decision-making processes, helping marketers, policymakers, and the industry in the design of effective strategies to promote edible insects most efficiently. The final goal is convincing consumers to shift their eating habits, seeing edible insects as a long-term sustainable food experience, instead of a novel, one-time purchase.

The timing of this research aligns with the growing awareness of sustainable food systems worldwide. There is a growing need to address the importance of global food sustainability and environmental conservation. Understanding the impact of psychological biases can help policymakers promote and reach the target consumer of this alternative protein food source. This research can potentially contribute to the fields of consumer behavior and sustainable food consumption.

1.4 Research Framework

Chapter 1: Introduction

The purpose of Chapter 1 is to introduce the researched topic and give the reader and overall overview of the study. A synthesized background of the study is presented, followed by the research objectives and the significance of the study. Finally, the structure of the thesis is summarized.

Chapter 2: Literature Review

In Chapter 2, previous studies and research related to the topic are analyzed. It offers an overview on the information already available and how this study can contribute to further amplify this knowledge. The chapter is divided into 4 sections, where different relevant information to this study is taken into consideration. The sections are the following: historical evidence on the consumption of edible insects, consumers' acceptance and rejection towards entomophagy, possible strategies to overcome these challenges and a more specific analysis on the view of edible insects in Italian population.

Chapter 3: Research Methodology

Chapter 3 is a detailed description of the methods used to carry out the investigation. This involves a description on the reasoning behind the choice of method used and the way the survey was created and distributed. Furthermore, the number of participants is stated and the survey structure is explained.

Chapter 4: Results

In Chapter 4, the results of the research are presented. The responses of each of the biases groups is compared to the Control group, using averaged scores and percentages. A series of graphs and tables are included in this chapter to illustrate the results.

Chapter 5: Discussion

The discussion of the results is carried out in Chapter 5. The findings are analyzed by the impacts on quality, taste and appearance, willingness to buy and try and attitudes towards insect foods. Following this analysis, the marketing insights are discussed relating the research results with the literature review studied.

Chapter 6: Conclusion, Limitations and Future Research

Lastly, Chapter 6 contains the concluding thoughts of the thesis. Followed by this, the limitations of the research are mentioned, and some recommendations for further research are outlined.

Chapter 2

Literature Review

In this Chapter, the literature available on the topic is presented and analyzed. This chapter starts with background information on the history of insects being consumed as food in different cultures. Then it moves on to describing some of the setbacks, habits and beliefs involved in the acceptance and rejection of insect-based food products in the western market. Next, some insights on possible ways of overcoming these barriers is presented, along with the role of social, followed by a deeper analysis of the Italian market perspective regarding this topic.

2.1 The Historical and Cultural Context of Insect Consumption

In numerous Western societies, the concept of eating insects is met with repulsion, often linked to notions of primitiveness. Eating insects can be seen as dangerous, unsanitary, and to be consumed only in extreme starvation situations. Such aversion has led to insects being overlooked in agricultural studies (FAO, Van Huis *et al.*, 2013) (Looy et al., 2014) (Yen, 2009).

Culture conditions what we eat, and the practice of entomophagy is markedly shaped by religion, tradition, and the social environment we grow up in (FAO, Van Huis *et al.*, 2013) (Vane-Wright, 1991). Therefore, it is common to see that once food preferences have been established, it is hard to change them. Humans tend to go for the foods that they are familiar with, and have an adversity, or even fear, to try extremely new things which are out of their comfort zone (Tuorila & Hartmann, 2020).

Nevertheless, there are many evidences that for centuries the consumption of insects as delicacies across various regions has been a recognized practice, with written documents found in Greek literature, and eating insects is still a well-established practice in numerous regions across the globe (Bodenheimer, 1951). Insects are being consumed globally, except in cultures originating from Western Europe and its descendants. Interestingly, before Europeans arrived in North America, indigenous people were known to have consumed insects. Across various regions, insects like grasshoppers, locusts, termites, and sizeable moth caterpillars hold culinary significance, finding their way onto plates in Africa. Similarly, grasshoppers are

popular in Korean cuisine, while in Japan, they have a rice dish that is cooked with wasps. The consumption of insects as food is also prevalent in Thailand, Australia, New Guinea, and different parts of the Americas, notably in countries like Colombia and Mexico (Vane-Wright, 1991) (FAO, Van Huis *et al.*, 2013).

Despite historical records indicating insect consumption, only in recent times has the concept of entomophagy begun to gain worldwide public interest. With this slow but steady spike of attention towards the topic, there has been many attempts to formulate a list of insects' species that are currently consumed by humans. Naturally, this number is hard to confirm, but there are some estimates. In 2013, the Food and Agriculture Organization of the United Nations (FAO) published their research "Edible insects: future prospects for food and feed security" in which they gave an estimate of 1900 edible insects. Ramos-Elorduy stated there are 2086 edible insects in her research published in 2009, a closer number to the one provided by Jun Mitsuhashi in his book "Edible insects of the world" published in 2016. This book enumerates 2141 species of edible insects, arranged like a dictionary by taxonomic group and then by country, being the first book on entomophagy of its kind (Mitsuhashi, 2016). However, the most recent list, made available online in 2017 by Wageningen University, concludes the existence of 2111 species of edible insects. This list was the work of Mr. Yde Jongema, taxonomist at the Department of Entomology of Wageningen University & Research, the Netherlands. Jongema drew from 167 publications spanning 1919 to 2016, alongside 12 cited web sources (Van Itterbeeck & Pelozuelo, 2022). Beetles are the most consumed insects, with 659 different species, followed by caterpillars at 362, and ants, bees and wasps at 321 (Jongema, 2017).

According to the FAO it is estimated that today at least 2 billion people traditionally consume insects as a part of their diets. However, this consumption is still concentrated in the areas previously mentioned and highly avoided by Europeans and North Americans alike.

As F. S. Bodenheimer further describes in his book "Insect as Human Food" (1951), there is no definite mean to confirm that the early human experienced inherent reluctance toward consuming insects. In fact, it is hard to explain why insects should be more repulsive to humans than other dead animals that are consumed today such as snails, mussels, shrimps or fish. Furthermore, humans have been able to look past many repellent smells and diverse textures that come from different types food that are currently socially acceptable. Therefore, with all the historical evidence that insect consumption appeared to be a prevailing practice for humans across the globe, what

lead to the decrease in its consumption? This will be discussed into more detail in the following subchapters. However, it is interesting to point out that Bodenheimer considered that a primary factor for this decrease is that a deep comprehension of a properly balanced diet's necessities, including essential vitamin levels, has primarily been achieved in modern times; edible insects provide protein, amino acids, and rich in micronutrients such as iron, magnesium and others (Rumpold & Schlüter, 2013), but the early unawareness of these facts might have had an impact on the disregard of insects as a suitable food option.

2.2 Factors Influencing Consumer Acceptance of Novel Foods

To talk about consumers' acceptance of insect-based foods, we first have to look into their general reactions towards novel foods. The European Commission defined novel food as a newly developed and innovative food, produced using new technologies and production processes; as well as any food that has not been used for human consumption to a significant degree or traditionally eaten within the European Union before 15 May 1997 (Regulation (EU) 2015/2283, 2015). When a food's intrinsic and extrinsic properties do not match expectations, there is a risk of failure in the market place. As novel products are new to the public, expectations have not yet been established, and this creates a window of opportunity for experimentation in creating, confirming and refuting expectations (Tuorila & Hartmann, 2020).

Acceptance or rejection towards novel foods comes from food preferences. These are not ingrained in the mind from birth, but rather have to be learned. For their own survival, infant humans need to quickly learn which foods are safe to eat. Their first impressions of safe and acceptable food come from what those around them eat, and with this early familiarity taste preferences are created. Besides learning about food safety by taste and texture when infants, as they grow older, children learn to identity safe foods by the appearance of it (Harris & Mason, 2017). The way that the food looks, texture, package, size or color can be perceived as related to the safety of the food, and a slight change from what the child is familiarized to, might lead to a disgust based rejection (Brown, 2012).

It has been shown that although embracing novel tastes can be cultivated at any age, with the help of multiple exposures to gain acceptance children in their initial phase of introducing complementary foods, between 4 and 6 months, are more accepting to introducing new tastes and more intricate flavors (Harris & Mason, 2017).

It is essential for children's health to provide them with a broad dietary intake; however, it is not often likely that a child will readily accept a new food. This can be

due to the development of food neophobia during early childhood and the preference for the already familiar foods (Aldridge et al., 2009). Food neophobia is the fear or reluctance to try new foods, and although it is known to change over the course of life, food neophobic behaviors start at around 18-30 months, and are thought to peak in childhood. Food neophobia usually starts with rejecting fruits, vegetables and mixed foods. With reports also indicating that if a disliked food touches a liked food, both will be rejected (Hazley et al., 2022) (Brown, 2012).

Food neophobia is an evolutionary trait, which has been preserved through generations to prevent possible intoxication coming from an unknown food source. However, nowadays when food safety is generally guaranteed, food neophobia can be considered a maladaptive behavior, as it prevents individuals from having a diverse diet that could lead to undesired nutritional deficiencies (Laureati et al., 2018). To avoid neophobia as much as possible, it is important to gradually introduce children to new food items. Children are likely to show disgust to unfamiliar foods, and several studies have shown that this fear towards unknown food can be overcome through exposure, creating a familiarity with the food (Aldridge et al., 2009).

Besides disgust, it is known that character plays a big role in responses to accepting novel foods, and unfamiliar foods can raise anxiety and distrust in people. Food neophobia is related to anxiety and it is considered a real phobia in adults and children (Aldridge et al., 2009) (Tuorila & Hartmann, 2020). This is of particular importance when talking about insect-based foods. When an object becomes the origin of a phobia, the sensations of disgust associated with that trigger can intensify. If a food closely associated with feelings of disgust becomes the root cause of anxiety, the potential for experiencing disgust becomes amplified (Thorpe & Salkovskis, 1998). Research indicates that there is a positive correlation between fear and disgust when assessed in relation to a stimulus that triggers phobia. Meaning, if someone is afraid/has a phobia towards spiders, this will amplify their rejection of considering spiders as food (Brown, 2012). This is an extra challenge to overcome, because not only insect-based foods are considered a novel food for the European market, but insects in general create fear in a lot of people, leading to their prompt rejection.

Due to our differences in ideology, religion, culture and exposure, our diet changes. All of these factors affect what we view as disgusting. Naturally, there are universal disgust items, such as rotting flesh, but besides these very specific similarities, disgust seems to be learned. What we deem as disgusting varies from person to person, as well as from what the society around us teaches us (Brown, 2012). The environment around an individual strongly influences their food choices, as eating is a highly sociable activity. People modify the quantity and what they eat based on what those

around them do, exhibiting modeling behavior. Furthermore, there is evidence that people use their eating behaviors to produce a positive image of themselves to others (Higgs & Ruddock, 2020).

Learning to like new foods can be a difficult task for most, as the main thing humans look for in food is safety and familiarity. With time, one can introduce novel foods into their diet, depending on the willingness and character of the individual, and try to familiarize themselves with the new food. However, there are many behavioral obstacles to overcome. As we are not born with food preferences, overall researchers suggest that to build this familiarity that can help ease the anxiety towards unknown foods, the first and most important factor is constant exposure, and secondly is theoretical knowledge of a product (Tuorila & Hartmann, 2020). There is also a link between constant exposure and reduced food neophobia (Brown, 2012). Taste exposure is the strongest method to developing trust, acceptance, and preference towards an unknown food, that is, the more familiar a food is, the more it is liked (Aldridge et al., 2009). This imposed a big challenge for novel foods, but even more specifically for insect-based foods.

Firstly, in Western culture, kids are not exposed to insects as food, but rather taught to stay away from them. Therefore, they would never consider them as food and develop familiarity. Secondly, insects are seen as dirty, disgusting and dangerous. This could create a possible phobia against insects, raise anxiety and further intensify food neophobia towards insects. Finally, the role media plays on our views. We are conditioned by what we are exposed to, and the media is constantly connecting the image of insects with unsanitary, unsafe or even dehumanizing (Looy et al., 2014). The combination of all these factors adds up to the big challenge that is the introduction of insect-based foods into our regular diets.

2.3 Promoting Insect-Based Food Acceptance in Western Culture

Given all the challenges that unfamiliarity and social boundaries present, this section of the literature review focuses on strategies that could help achieve consumers' acceptance. Researchers propose addressing factors that influence demand (altering consumers' perceptions) and factors that influence supply (developing appealing, practical, unique and easily accessible insect-based products). To reach regular consumption of insects, besides focusing on psychological aspects, we also need to consider the influence of one's prior experiences, social environment, broader cultural connections, culinary expertise, and factors such as product availability, pricing, presentation and taste. (Tan & House, 2018).

First thing to reflect on is society. Considering a household, it is easier for people who live alone to introduce insects into their diets than a family, where even if one individual is willing to do so, the adoption becomes more challenging if the rest of the household isn't interested (House, 2016). Social norms play an essential role in Westerners' willingness to try insects (Jensen & Lieberoth, 2019) (Balzan et al., 2016).

The following steps are recognized for the introduction of insect-based foods into the Western food culture: awareness, acceptance, adoption and recommendation. Each of these steps is met with factors that affect them such as food availability, food literacy, food taboos, food neophobia and food ideology (House, 2016), (Batat & Peter, 2020) (Alhujaili et al., 2023). This section explores how the market can leverage these factors into the adoption and recommendation of insect-based foods.

The ideal goal is to shift the consumers' eating habits, making insects a part of their long-term diet, instead of viewing it as a unique one-time purchase.

There are several potential opportunities for marketers, the industry and policy makers to consider. Alhujaili et al., (2023) found that one main reason that consumers are not venturing in the regular consumption of insect-based food is the simple unavailability of such products. The motivation to consume and purchase insect-based foods increases if the consumer believes they could easily attain them.

Even if a consumer is willing to try insects, or incorporate them into their diet, without the products being easily available, the purchase and consumption becomes challenging. A study done on why Americans eat what they eat and the influences of taste, cost, convenience, nutrition and weight control concerns showed convenience plays a very important role in people's decision on what to consume (Glanz et al., 1998). So, a very important step to consider is making these products more easily available for consumers.

Naturally, being available is not the only step to ensure consumption. A study done in Belgium after 2 years of the introduction of insect-based foods into the market revealed that even though 79% of the interviewed people were aware of the availability of insect-based foods, only 11.2% had tried them (Thielen et al., 2018). This clearly shows that consumers are still having a hard time embracing insects into their diet, even when they are easily available, and that psychological and behavioral aspects are more pressing aspects to take into consideration. However, availability is certainly a crucial step for insect-based foods to be consumed. The process of

acceptance and incorporation will take time, but as these products become more common, so will the consumers' familiarity with them. Familiarity is remarkably essential when it comes to food acceptance, therefore seeing the products more often, and easily available at their usual supermarket can reduce the strangeness and alien feelings these products tend to invoke in consumers. This constant encounter with other regular every day products that consumers are already used to buying, might help reduce the taboo around the food and slowly normalize the products in their minds.

As shown by the study conducted in Belgium by Thielen et al., 2018, availability is not enough. An important factor that should come hand in hand with availability is food literacy. Learning or hearing about entomophagy is important so that consumers can become aware of the potential benefits (environmental and nutritional) and incorporate insects into their diets. Furthermore, knowing how to prepare and eat insects at home can positively influence acceptance (Alhujaili et al., 2023). Repeated exposure to information on entomophagy can help increase familiarity.

Batat & Peter, (2020) noted 3 types of knowledge that can be applied to the consumption of insect-based foods. These are analytical, historical-hermeneutic, and critical-emancipatory. It would be ideal for the industry to try and address all these types of knowledge to cultivate a repeated consumption of insects. Analytical knowledge refers to the interest of a person on the concrete aspects of what they are consuming, such as: health benefits and sustainability. Historical-hermeneutic knowledge refers to the interest of a person to gain comprehension by interpreting significances, such as symbolic ones through food histories. Lastly, critical-emancipatory knowledge is the person's want to change their current costumes, transitioning into different approaches of food consumption. This is done by their interest in learning through questioning taboos, established traditions and myths.

Food literacy is an excellent tool for marketers and policy makers to slowly introduce the idea of insect consumption to the public through social media, articles, newsletters and ad campaigns. By creating information that addresses all these types of knowledge marketers can be one step closer to expanding their market. More than providing information, it is important for them to take into consideration who their target market is and how they receive and absorb this information, as even inside of Europe, opinions can be diverse.

A study conducted by Piha et al., (2018) comparing North and Central Europe found that enhancing consumer knowledge on insect-based foods is an effective strategy for its promotion, particularly for Northern Europeans. The study divided consumer knowledge into three distinct dimensions: objective knowledge, subjective knowledge and product-related experiences. Objective knowledge is the factual information one has about a product. Subjective knowledge is what one thinks they know about a product, and product-related experiences is the familiarity with the product.

They found that for Northern Europeans, objective and subjective knowledge played a bigger role in their willingness to eat insects, on the other hand for Central Europeans, product-related experiences were more significant. The reason for this, they considered, was that in Central Europe the introduction of new unknown foods is likely rejected is based on their mature food culture, rooted in years of strong tradition. On the other hand, Northern Europe's food culture is less established.

Considering their findings, they highlighted two possible strategies for the promotion of insect-based foods. An "educational" strategy, which would involve providing information on the topic. This be more impactful for people whom objective and subjective knowledge is more important. And a "sensorial" strategy, which would involve having people try insects. This would be more impactful for people whom product-related experiences are more important and for whom food neophobia is higher.

Furthermore, producers of insect-based foods should also take into consideration that different insect species are perceived differently across countries, and make informed decisions as into which insects to incorporate into their products (Schäufele et al., 2019). For instance, in Romania, consumers prefer locusts and ants. In Japan, wasp larvae and grasshoppers take preference. In Italy, crickets, bee larvae, grasshoppers, mealworms, silkworms and giant water bugs are preferred (Alhujaili et al., 2023).

Curiosity is a main factor that promotes the willingness to try insect-based foods, and it has a significant boosting effect (Stone et al., 2022). However, willingness to try does not directly translate into prolonged consumption of the product. For the introduction of these products into a regular diet, more than curiosity is needed. In fact, a study done by Kostecka et al., (2017) revealed that out of those who had consumed insects in the past (10.5%), 7.2% tried this type of food only once.

Numerous research indicate that individuals that believe insects are health beneficial and sustainable are more willing to eat insect-based foods (Ordoñez López et al., 2023) (Thielen et al., 2018) (Menozzi et al., 2017). Nevertheless, Verbeke, (2015) states that even rational thoughts about environmental impact and nutritional advantages are not as important when it comes to incorporating these products and changing food habits. Environmental concern is consistent with people who are introducing insects into their diets, but it is not a standalone deciding reason. The factors affecting repeated consumption of insect-based food does not fall that far from the ones consumers look for with their regular every day food products: taste, availability, price, and how easily the new food can incorporate into their already existing food habits (House, 2016).

Furthermore, House, (2016) found that the target market for insect-based foods could be people with an open diet. The consumer that is most likely to adapt these foods into their diet are meat reducers, the ones that are used to consuming vegetarian convenience foods or vegetarian meat replacement foods such as burgers, nuggets, etc. These is because these products assimilate to the insect-based options currently available, and they can easily integrate them into their meals without much change in their routines. Furthermore, these consumers are considered more health-conscious, brave, imaginative and knowledgeable, all characteristics needed in people willing to venture into novel foods (Hartmann et al., 2018). Even vegetarians can be a target market as some have a harder time connecting insects to animals, therefore, exclude insects from their ethical reasons to not consume living beings. These findings are furthered confirmed by Verbeke, (2015), consumers who were not regularly eating meat substitutes believed meat is nutritious and healthy and had no intention to reduce their intake. Consequently, these consumers had a lower probability of adopting insects into their diets. Additionally, consumers that would have a hard time incorporating these types of food into their diets are culinary enthusiasts, who are used to using basic ingredients rather than convenient foods, making everything from scratch.

Most research on entomophagy is focusing on the willingness to eat insects of a specific population, and how to increase acceptance through identifying the challenges, overcoming disgust and neophobia, educating the public, changing attitudes and diminishing the Western cultural stigma. However, as previously stated, trying a product doesn't necessary translate into adding it into one's diet.

Overall, a number of different strategies can be put into place to normalize entomophagy in Western food culture. Availability, food literacy, taste, price, presentation and the ability to fit into people's food routines affect the final purchase and continuous consumption of insect-based foods. It is important to mention that research indicates that the main target market for insect-based foods might be ethically-motivated consumers, who are looking for alternative options to uptake their protein intake while considering the impact that conventional meat has on the environment. However, the answer to the potentially most effective strategy for the success of insect-based foods might be simpler.

Repeated consumption and exposure have shown to be a main driver to changing perception into a more positive attitude (Ordoñez López et al., 2023) (Le Goff & Delarue, 2017) (Hartmann et al., 2015) (Lensvelt & Steenbekkers, 2014). Instead of focusing on gaining the biggest quantity of consumers, producers should focus on gaining an initial group of early adopters. To do this, they should aim for the same characteristics that everyday products need: tastiness, distinctiveness, affordability and availability (House, 2016).

Likewise, Shelomi, (2015) proposed that to develop entomophagy the market should simply focus in making the products available instead of convincing them to eat insects. Through the consistent view of the products in their everyday stores, insect-based foods will become normalized by the public. "Create a safe and steady supply, and demand will take care of itself."

2.5 Entomophagy in the Italian Market

In 2019, approximately 9 million people in Europe included insects and their related products in their diets. Projections indicate that by 2030, this number is expected to soar to a staggering 390 million consumers and edible insect-based food products will reach a substantial 260,000 tones. (IPIFF Questionnaire on the EU market - March 2020).

Research done on the current situation of the edible insect market in Europe reveals that as of the date of the data collection, there are 59 companies involved in the production, sale or processing of insect food products. The business, as expected, is concentrated in Northern European countries. The countries with the highest number of activities are the United Kingdon, Germany and Belgium. Out of these 59

companies in Europe, only one of them is Italian, operating as an e-commerce business (Pippinato et al., 2020).

Overall, when considering the European market, consumers in Northern Europe have a more positive opinion and are more knowledgeable about insect food when compared with consumers in Central Europe. This could be due to the fact that in Central Europe the incorporation of unfamiliar foods is often met with resistance due to their well-established food culture deeply rooted in longstanding traditions. In contrast, Northern Europe has a less fixed food culture (Piha et al., 2018).

Correspondingly, Italians rely a lot on their traditions and gastronomic history.

Several studies have specifically collected and analyzed the opinions and perceptions of Italians towards insect foods. In this section of the literature review a synthesis of these investigations' results are discussed.

It is natural to expect social influences to play a big part in the adoptions of new foods. The rich Italian food history has been passed on from generations, and as these food traditions have been established, there is a sense of unspoken rules that Italians have when it comes to food. In fact, negative views expressed by family and friends towards entomophagy can stop Italian consumers from considering or adopting insect into their dietary habits (Sogari, 2015). Therefore, the influence of what other people think is a big determinant in their decision to consume edible insects (Balzan et al., 2016).

These results also alight with a recent study conducted by Mancini & Antonioli, (2022). They identified a main driver for consumption of insect-based foods in Italians: personal or close friends having past experiences with insect foods and food literacy. The main barriers are cultural rejection and appearance and taste. Cultural prejudice decreases willingness to try and familiarity increases it. Furthermore, their recommendations are to develop insect-based foods that mirror familiar food products.

Research by Cicatiello et al., (2016) found that highly educated Italians, and those who have more familiarity with foreign foods have higher willingness to try insects. Furthermore, they pointed out two main barriers to insect consumption for Italians: food safety is not guaranteed, and once again, the appearance of insect foods.

It is interesting to notice, that throughout all the papers analyzed in this literature review section, the results consistently revealed males are more willing to consume insects than females.

Tuccillo et al., (2020) research exposed that Italians prefer a low level of insect visibility, which aligns with the previous studies mentioning appearance as a main barrier of consumption. The willingness to eat different species is as follows: crickets, bee larvae and grasshoppers, mealworms and silkworms, giant water bugs. Overall, adult insects are preferred.

Italians are slowly becoming more aware about the health benefits related to the eating of insects, but they are still not ready to consume them. Regarding attitudes, Italians motivation to reject insects besides disgust related to food degradation is appearance, odors and taste. However, promising results reveal that willingness to taste edible insects in the future increases after trying them once (Sogari et al., 2017).

Italians have a lot of trust in the culinary abilities of their chefs. Research by Balzan et al., (2016) revealed that Italians are willing to eat insects, but not if they have to prepare them themselves. Participants stated that they would not purchase insects at a store because of the worry of not knowing how to properly cook them, or to get sick after consuming them. They prefer to have their first tasting experience at a restaurant, or with a knowledgeable person who already understands how to prepare and consume insects.

Nevertheless, currently there are no restaurants serving insect-based foods in Italy. Consequently, it can be observed that the general population in Italy remains quite distant from the idea of incorporating insects as a regular part of their dietary habits, indicating a notable reluctance or hesitation towards embracing entomophagy as a culinary practice.

In conclusion, one of the primary strategies to encourage Italians to incorporate insects into their diets involves providing them with a more educational and practical information regarding the preparation and consumption of insects. In addition to this, enhancing the accessibility of insect-based products within the market is another pivotal aspect that can play a crucial role in promoting their acceptance and integration into the Italian culinary culture.

Chapter 3

Research Methodology

In this Chapter, the research methodology is described. First, there is a brief differentiation between quantitative and qualitative methods, and the reason why the first technique was chosen as the research approach for the thesis is explained. Then, and in-depth description of the survey used to collect the data is presented, followed by its structure.

3.1 Quantitative and Qualitative Methods

This study aimed to examine how Italian consumers feel about the possibility of introducing insect-based foods into their diet, and how their perspective might be affected by several psychological biases that will be explained in more detail in the following sections.

To understand and analyze consumers' perceptions, information was collected through market research, which can be divided into primary and secondary data. Primary data refers to collecting new information and secondary data refers to utilizing information that is already available. As the topic of consumers' perspectives towards insect-based food perspectives is relatively new and not a lot of research has been done on it, it was decided that the best approach would be to take the primary data approach, gathering data from scratch.

When collecting primary data, there are two different research methods that can be used: quantitative or qualitative. There is a clear difference in how data is collected and analyzed in both approaches. Qualitative research starts with broad, flexible research questions that can evolve during the study, while quantitative research begins with a fixed narrow research question. Quantitative research can be defined as "a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques." (Fleetwood, 2018). This method involves collecting numerical data to analyze, and larger groups can be analyzed via online surveys, polls and questionnaires. On the other hand, qualitative research "involves the systematic collection, organization, and interpretation of textual material derived from talk or observation" (Malterud, 2001).

In this type of non-numerical research method, the most common ways of collecting and analyzing the data are interviews, focus groups and observation, therefore a smaller group is studied.

There are many advantages to conducting quantitative research. It offers quick and reliable data collection, with the opportunity to analyze a larger population with reduced biases. These are all essential for the results we were aiming to obtain. Furthermore, with a careful analysis of the data, this method allows for predictions on how the future of a product might evolve (Fleetwood, 2018). This is essential for further research, especially in such a new topic as the consumption of insect-based foods in a European country.

Since this study is focused on analyzing the Italian population with a specific question in mind, it was deduced that the most adequate research method is the quantitative. The survey distributed was a structured questionnaire composed of closed questions with multiple-choice answers. This allowed to collect logical and structured information. With a large group of respondents, the aim was to make the questionnaire simple to understand and quick to answer, to avoid survey fatigue.

3.2 Research Methods

3.2.1 The Survey

With the survey, the objective was to analyze two different perspectives. The first part of the survey was focused on how personality traits affect attitude, and willingness to buy and try insect-based foods. The second part of the survey was testing if the arbitrary exposure to social proof priming affects the consumer's perspective and their willingness to buy and try insect-based foods.

This research paper is focused on the second part of the survey, related to social proof priming. To obtain this data, a structured survey was created using a web-based software named Qualtrics. This is a user-friendly software that provides the tools to allow users to create effective surveys. After the creation of such, Qualtrics provides the user with a link that can be easily distributed online. The distribution took place through social media channels such as Instagram stories and direct messages, several city and university groups on Facebook and direct messages on WhatsApp. With the link, a short message was provided explaining the purpose of the survey, and the request for participants to share it with acquaintances. The collection of responses

took place from April 2023 to June 2023. The survey was first created in English for the purpose of this study and later translated into Italian using the built-in translating option Qualtrics provides. As the survey was completed by foreigners and Italians alike, both languages were available to participants to choose the language they felt more comfortable with. As the main target of this study is the Italian consumer, the information was later filtered and analyzed, using only the results of Italian consumers. There was a total of 393 responses, 336 of which were Italians. From the 336, some incomplete answers were removed. After all changes and modifications, the final number of viable responses was 268.

3.2.2 Survey Structure

The survey started with an information note and consent, where the purpose of the study was shortly detailed. Besides this, they were also informed of the treatment of personal data and asked for their consent to use their information. After the participant consented, the survey would begin.

The first section of the survey was about demographics. This entailed: sex assigned at birth, year of birth, level of education, nationality and, if the answer to nationality was Italian, a next question would appear for them to indicate their region of origin. The regions were divided into 4: North, Center, South and Islands.

After this initial part, the survey was created by choosing the elements that had proven to be important for insect consumption in previous research on entomophagy.

The following section of the survey had the BFI (Big Five Inventory) personality test adapted from (Rammstedt & John, 2007). In this section, participants had to agree or disagree with statements about their personality based on a 5-point Likert scale, going from 1=strongly disagree to 5=strongly agree.

In the third section, participants were asked to answer questions related to their eating and food-purchasing habits. Taking inputs from (Cicatiello et al., 2016) the section included questions related to the participants' meat consumption, food choices, the number of eco-friendly products they purchase on a regular basis, and the number of times they eat outside of home and at ethnic restaurants.

Following that, in the fourth section participants were presented with a set of questions to measure food neophobia adapted from (Fischer & Steenbekkers, 2018). Here the statements described reluctance to eat or try new foods. The participants

were instructed to choose which statement represents them best based on a 5-point Likert scale, going from 1 =does not represent me at all to 5= represents me completely.

The fifth section of the survey was focused on social proof priming.

The participants were divided into 5 different bias groups, which were arbitrarily designated by the software used to make the survey, Qualtrics. These groups were: Control, Celebrity Bias, Chef Bias, Social Bias 25%, Social Bias 50% and Social Bias 75%. Each bias will be individually explained below.

To start, the participants were arbitrarily exposed to different types of psychological bias priming before replying to questions on their quality, taste, appetizing expectations and willingness to try and buy different products. The psychological bias priming was given by showing information similar to magazine and newspaper articles talking positively about the consumption of insect-based foods. These text images were created with Canva, a free online graphic design tool.

The participants were shown different articles depending on which group they were assigned to (with the Control group having no article). The page that displayed the social proof priming images had a time constraint of 1 minute, so the participants could not click "next" on their screen before that time had passed. This was done to avoid them moving on to the next page without them fully reading the text.

1) Celebrity Bias group

For this psychological bias, the aim was to discover if having a well-known celebrity promoting the consumption of insects would have an impact on participants answers. In the image, there was the celebrity Nicole Kidman eating insects, along with a text explaining that she has introduced insects into her diet.

Daily Mail

PRESS RELEASE

NEWS 30 JULY 2022

CELEBRITIES ARE CRAZY ABOUT INSECTS!

-Insects can not longer miss from my diet- declared Nikole Kidman.

During an interview with our newspaper Daily Mail, the stunning actress Nikole Kidman reported that she has long introduced insects into her daily diet. "Insects can no longer miss from my diet", said the actress, "they are very nutritious". She added: "I often prepare many recipes made of insects for dinners with friends; they love them too. There are no more reasons why eating insects can not be normalized, they are very delicious!"

www.dailymail.com

Image 1. Celebrity Bias article

2) Chef Bias group

For this psychological bias, the aim was to discover if having a well-known chef in the Italian community promoting the consumption of insects would have an impact on participants answers. In this image, there was chef Carlo Cracco, along with a text explaining his often use of insects in his world-renounced restaurants and his favored recipe including insects. However, due to the amount of data, it was decided to exclude this particular group from further analysis executed in the Chapter 4, focusing on the remaining 5 groups.

FOOD&WINEITALIA NEWS

PRESS RELEASE

DINNER WITH CARLO CRACCO AND BUGS!

Few days ago, the Michelin-starred chef Carlo Cracco posted on his restaurant's Facebook page 'La Sidreria' some insect-based food recipes. Chef Cracco invited his clients to be seduced by insects-based dishes: "I often use insects in my restaurants. They are tasty and very nutritious", reported the Chef. "Insects can be used in many recipes. My specialties? Grasshoppers braised with red wine and Venus rice cream with worms. Delicious! "

FOOD&WINEITALIA

Image 2. Chef Bias article

3) Social Bias

For the following psychological bias, articles stating that Europeans are starting to introduce insect-based foods into their diets were created, along with some images of regular people consuming insects. For these articles, the same text and images were used, just altering the percentage on each of them. The article headlines read:

3.1) 25% of Europeans are now ready to consume insects

Image 3. 25% Social Bias article

3.2) 50% of Europeans are now ready to consume insects

Image 4. 50% Social Bias article

3.3) 75% of Europeans are now ready to consume insects

Image 5. 75% Social Bias article

After the psychological bias priming page, there was an introductory text explaining to the participants that they were about to see images and reply to a few questions per image based on what statement represented them best.

In this section of the survey participants were asked to answer questions about 20 images of different products. Each image had the exact same set of 5 questions, asking about the quality, taste and appetizing expectation, as well as willingness to try and buy the product. The participants could answer based on a 6-point Likert scale, with 1 indicating a negative answer and 6 indicating a positive answer.

As currently insect-based foods are not available in the Italian market, foreign products were used. Naturally, some had their labels in a foreign language, however, all products were presented with an accompanying Italian description.

Lesser popular brands for the normal products were purposely chosen to avoid having the participants show a preference for familiar/famous products.

Out of the 20 products presented, 10 were insect food products and 10 were non-insect foods products, these 2 categories were further divided into 2 sub-categories as explained below:

The products were divided into 4 categories:

1. insect products
   - Insect-processed products, meaning products where the insects are not visible (e.g., cereal bar made out of insect flour)
   - Insect-raw products, meaning products where the insect is visible (e.g., roasted grasshoppers)
2. non-insect products
   - Normal processed products (e.g., chocolate chip cookies)
   - Normal raw products (e.g., shrimps)

Below one image for each category is shown as an example, the entire 20 images used for the survey can be found in Appendix B

- Insect-processed products (no visible insects)

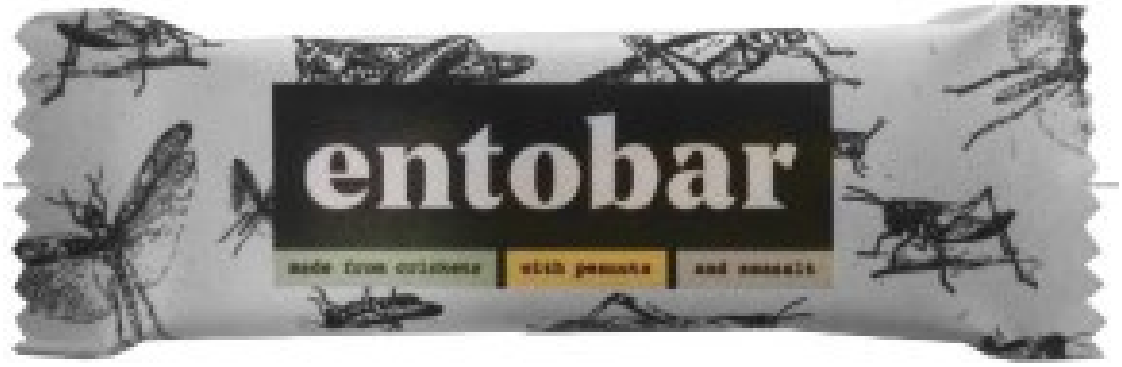


Image 6. Cereal bar made from crickets

- Insect-raw foods (visible insects):

Image 7. Whole roasted grasshopper snack

- Normal processed products:

Image 8. Chocolate chip cookies

- Normal raw products:

Image 9. Raw indo-pacific shrimps

With this categorization, the intention was to get a fair comparison between insect-based foods and non-insect-based foods, by purposely choosing products in each category that are similar to each other. In the processed products category, products such as an insect-based cereal bar and a regular cereal bar were chosen. Likewise, for the raw products category somewhat similar products were chosen, such as roasted grasshoppers and shrimp.

Finally, for the last section of the survey, participants were asked a series of questions related to their attitudes towards novel foods, adapted from (Fischer & Steenbekkers, 2018). The questions were related to their willingness to eat insects in the future and their overall perception of them. Participants had to choose their level of agreement to the statements based on a 7-point Likert scale going from 1= strongly disagree to 7= strongly agree. There was a total of 8 statements, 5 positives and 3 negatives. All the statements are further analyzed in Chapter 4 of this thesis, and the link to the full survey can be found Appendix A.

3.2.3 Data Analysis and Evaluations

Subsequently, the information gathered via the Qualtrics platform was downloaded and brought into Microsoft Excel spreadsheet software for organization and analysis. The analysis mainly revolves around comparing the data by calculating weighted averages and percentage growth.

Chapter 4

Results

The results chapter of this thesis presents a comprehensive account of the findings obtained through the analysis and interpretation of the gathered data, aimed at addressing the research questions and hypotheses posited in the preceding chapters. The results chapter is divided into the following sections: demographics, product questions, and attitudes towards insect-based foods.

4.1 Demographics characteristics

The total amount of responses collected from Italian consumers was 336. From the 336, incomplete answers were removed. The final sample is composed of 268 participants. Participants were asked to indicate what region they are from. The regions were divided in: North (65%), Center (13%), South (15%) and Islands (7%).

The sample analyzed is mostly females (73%), with 26% males and 1% responses from participants who did not want to specify their gender.

The participants were then grouped by age range to later analyze their preferences at a generational level. The age groups were divided as follows: 15-20 (3%), 21-30 (68%), 31-40 (15%), 41-50 (4%), 61-70 (4%), 71-80 (1%). Notably the biggest group was from 21 to 30 years old. This is possibly due to the method used to distribute the questionnaires, through social media platforms.

Regarding education levels, the participants were divided as follows: middle school diploma (4%), high school diploma (31%), bachelor's degree (38%), master's degree (21%), and specialization/doctorate (6%).

Age			*Gender*			*Education*			*Place of residence*		
	%	n		%	n		%	n		%	n
15-20	3%	7	Female	73%	196	Middle school diploma	4%	10	Center	13%	34
21-30	68%	183	Male	26%	70	High school diploma	31%	84	Islands	7%	20
31-40	15%	39	Unknown	1%	2	Bachelor's degree	38%	101	North	65%	173
41-50	6%	15				Master's degree	21%	55	South	15%	41
51-60	4%	11				Specialization/doctorate	6%	17			
61-70	4%	11									
71-80	1%	2									

Table 1. Sociodemographic characteristics of the sample. Breakdown by age.

4.2. Product questions

As explained in Chapter 3, in this section of the survey participants were asked 5 questions per product, on 20 different products about their taste, quality, and appetizing expectation, willingness to try and buy a product.

Every product had 5 questions each, with a Likert scale point from 1 to 6. 1 being a negative opinion (e.g., very bad quality, very bad taste) and 6 being a positive opinion (e.g., very good quality, very good taste).

After collecting all the data, the average score was calculated for each question's response. These averages serve as the basis for the analysis of the results.

Below the results are presented in subchapters of the 5 different groups that will be analyzed: Control, Celebrity Bias, Social Bias 25%, Social Bias 50% and Social Bias 75%. Graphs of these data are available in Appendix C.

4.2.1 Control

The control group had no article shown before the questions about the products. In total, 134 participants (50%) were in the control group. The table below illustrates all the average responses for this group.

	Quality	*Taste*	*Appetizing*	*Willingness to try*	*Willingness to buy*
Insect Processed	3.25	3.07	2.82	3.14	2.66
Insect Raw	2.66	2.09	1.69	2.17	1.80
Normal Processed	4.05	4.27	4.20	4.47	3.90
Normal Raw	4.20	4.20	4.01	4.46	3.78

Table 2. Average scores of the control group.

In the data from the table, it is observed that normal products have overall higher scores than insect products, just as the insect-processed products have an overall higher score than insect-raw products. This tendency repeats itself across every group analyzed.

The control group is the starting point to compare to our 4 different bias groups, to understand if the biases influence the consumers' perception or not. We can notice overall higher scores for normal food, as previously mentioned, however, it is interesting to point out that with 6 being the maximum possible score, no scores for no category go higher than 4.5.

The insect-processed products' quality expectation is only 0.8 points behind normal processed products' quality expectation. However, the willingness to buy for both of these products has a score difference of 1.24 points. This could indicate that even though consumers have high quality expectations for insect-processed products, they would not necessarily be interested in buying them. The same applies to willingness to try for both these product categories, with a score difference of 1.33 points.

Furthermore, the insect products appetizing category shows significantly lower scores than the same category for normal products, with insect-raw products scoring the lowest across all categories for all products. Therefore, even though the quality expectations scores for insect products are not so different from the normal product scores, consumers still do not find insect products as appetizing.

4.2.2 Social Bias 25%

The Social Bias 25% group had an article indicating that 25% of Europeans are now regularly consuming insects as part of their diets before the questions about the products. In total, 32 participants (12%) were in the Social Bias 25% group. The table below illustrates all the average responses for this group.

	Quality	*Taste*	*Appetizing*	*Willingness to try*	*Willingness to buy*
Insect Processed	3.20	3.06	2.89	3.34	2.61
Insect Raw	2.69	2.14	1.88	2.21	1.67
Normal Processed	4.06	4.28	4.27	4.60	3.94
Normal Raw	4.23	4.28	3.96	4.63	3.95

Table 3. Average scores of the Social Bias 25% group.

For this group, the same tendency is observed, where normal products score higher than insect products. In comparison with the Control group, we can see a slight increase in the numbers for both insect-processed products and insect-raw products in a few categories. For insect-processed products quality, taste and willingness to buy go down, whereas appetizing and willingness to try go up. For insect-raw products willingness to buy goes down while quality, taste, appetizing and willingness to try go up. Within the 5 categories, for both insect-processed and insect-raw products, there is a total of 6 increases and 4 decreases.

4.2.3 Social Bias 50%

The Social Bias 50% group had an article indicating that 50% of Europeans are now regularly consuming insects as part of their diets before the questions about the products. In total, 28 participants (10%) were in the Social Bias 50% group. The table below illustrates all the average responses for this group.

	Quality	*Taste*	*Appetizing*	*Willingness to try*	*Willingness to buy*
Insect Processed	3.24	2.95	2.72	3.10	2.64
Insect Raw	2.86	2.23	1.84	2.55	2.10
Normal Processed	3.84	4.43	4.41	4.51	4.07
Normal Raw	4.21	4.41	4.24	4.54	4.01

Table 4. Average scores of the Social Bias 50% group.

Once again, the trend for normal products applies, with all of them having higher scores than insect products. Besides this, compared to the Control group, the Social Bias 50% group has a small but consistent decrease across all categories for insect-processed products, and a slightly bigger increase across all categories for insect-raw products. This results in a total of 5 increases and 5 decreases for insect products.

4.2.4 Social Bias 75%

The Social Bias 75% group had an article indicating that 75% of Europeans are now regularly consuming insects as part of their diets before the questions about the products. In total, 22 participants (8%) were in the Social Bias 75% group. The table below illustrates all the average responses for this group.

	Quality	*Taste*	*Appetizing*	*Willingness to try*	*Willingness to buy*
Insect Processed	3.37	3.11	3.02	3.30	2.69
Insect Raw	2.78	2.11	1.63	2.30	1.73
Normal Processed	4.16	4.43	4.41	4.64	4.09
Normal Raw	4.35	4.47	4.27	4.54	3.83

Table 5. Average scores of the Social Bias 50% group.

For the Social Bias 75% the trend of normal products scoring higher than insect products still applies. Furthermore, the data shows more increases in numbers compared to the Social Bias 25% group and the Social Bias 50% group. For this group only 2 categories decreased, which are appetizing and willingness to buy for insect-raw products. Besides these 2, all the other categories for insect products go up. Finally, in this category, we can see the social bias making a difference, with only 2 decreases across all categories and 8 increases.

4.2.5 Celebrity Bias

The Celebrity Bias group had an article indicating that a well-known celebrity is regularly consuming insects as part of their diet before the questions about the products. In total, 28 participants (10%) were in the celebrity group. The table below illustrates all the average responses for this group.

	Quality	*Taste*	*Appetizing*	*Willingness to try*	*Willingness to buy*
Insect Processed	3.47	3.26	3.21	3.41	2.86
Insect Raw	2.96	2.31	1.89	2.44	2.05
Normal Processed	4.16	4.43	4.56	4.86	4.39
Normal Raw	4.19	4.26	4.02	4.46	3.93

Table 6. Average scores of the celebrity group.

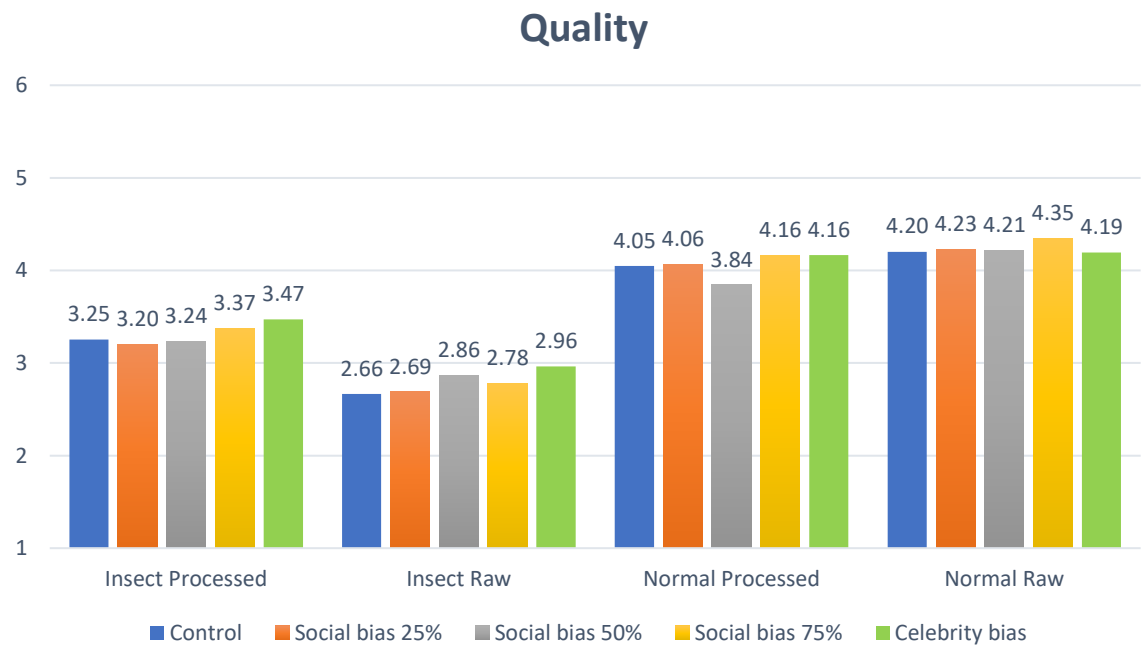
In the Celebrity Bias group, when comparing normal products to insect products, the trend of higher scores for normal products continues. This is the only group in which

all the categories of insect products, raw or processed products, show an increase. This means the total decrease is 0 and the total increase is 10.

The graphs below were created to illustrate a clearer further comparison between the 5 different groups analyzed divided by each category asked to the participants: quality, taste, appetizing, willingness to try and willingness to buy. These were created using the data shown in Tables 2,3,4, 5 and 6.

As we can observe across Graph 1, 2, 3, 4 and 5, there is an overall increase in the scores of all bias groups compared to the control group when it comes to the insect products, with a few exceptions. These will be more detailly discussed with each category individually along with its respective graph. On the whole, the Celebrity Bias group holds the highest scores in all categories for insect products.

It is important to notice that, even though the highest score possible is 6, the highest score obtained by any of the products in any group is 4.86, Graph 4 (normal processed, Celebrity Bias group). Therefore, while the difference in scores may appear modest, it holds significance due to the fact that the overall scores are already quite low.

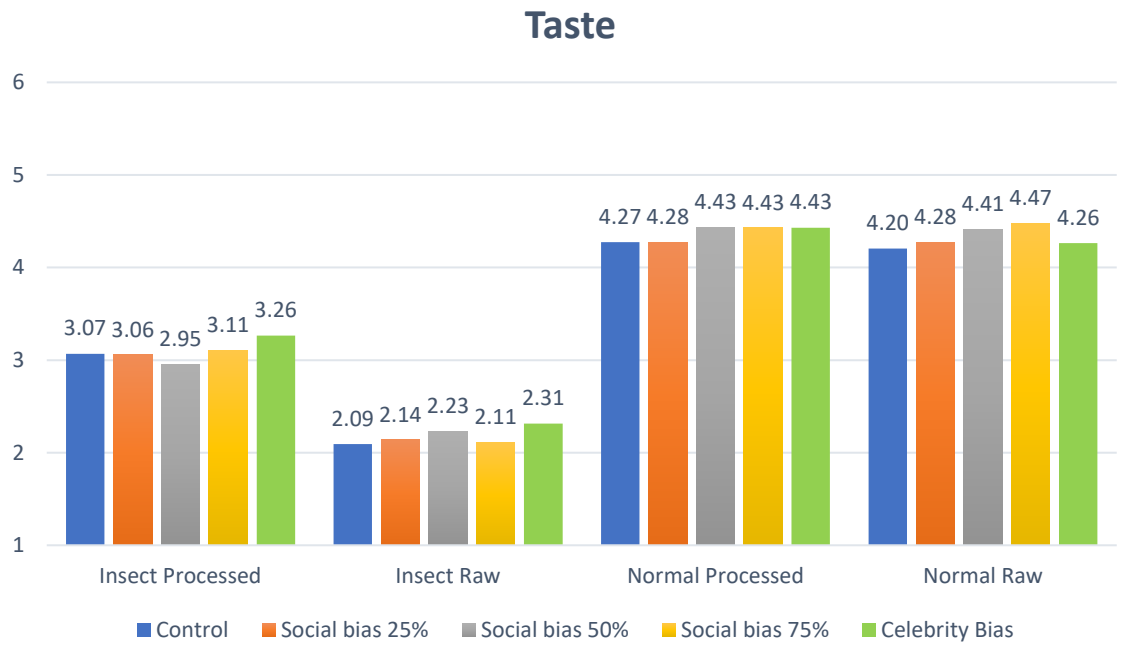


Graph 1. Comparison of quality scores of all groups.

Comparing each group individually, in Graph 1 it is shown that for insect-raw products, all the bias groups have an increase, however small, compared to the Control group. For the

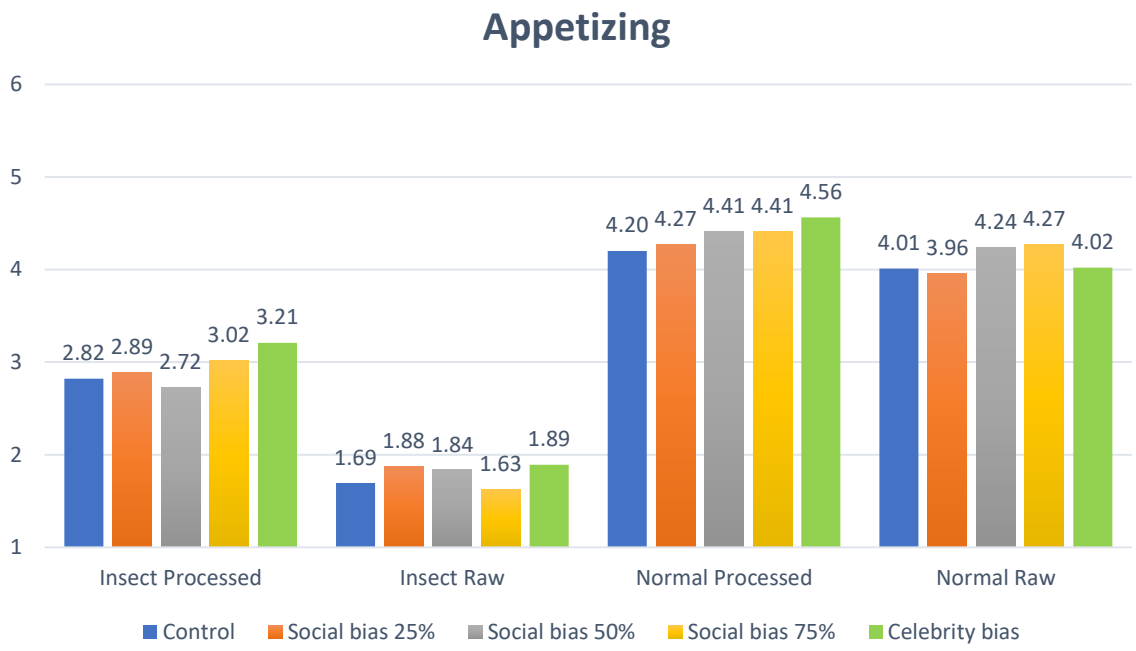
insect-processed products, the groups of Social Bias 25% and Social Bias 50% have a small decrease compared to the control group. This might be due to the percentages in the articles mentioned in Part 3 of this research being lower than the one in the Social Bias 75% articles. Overall, the Celebrity Bias group has the highest increases in both insect-processed and insect-raw.

Furthermore, in the quality category, we can observe the highest score for insect products across all categories, 3.47, which belongs to the Celebrity Bias group.



Graph 2. Comparison of taste scores of all groups.

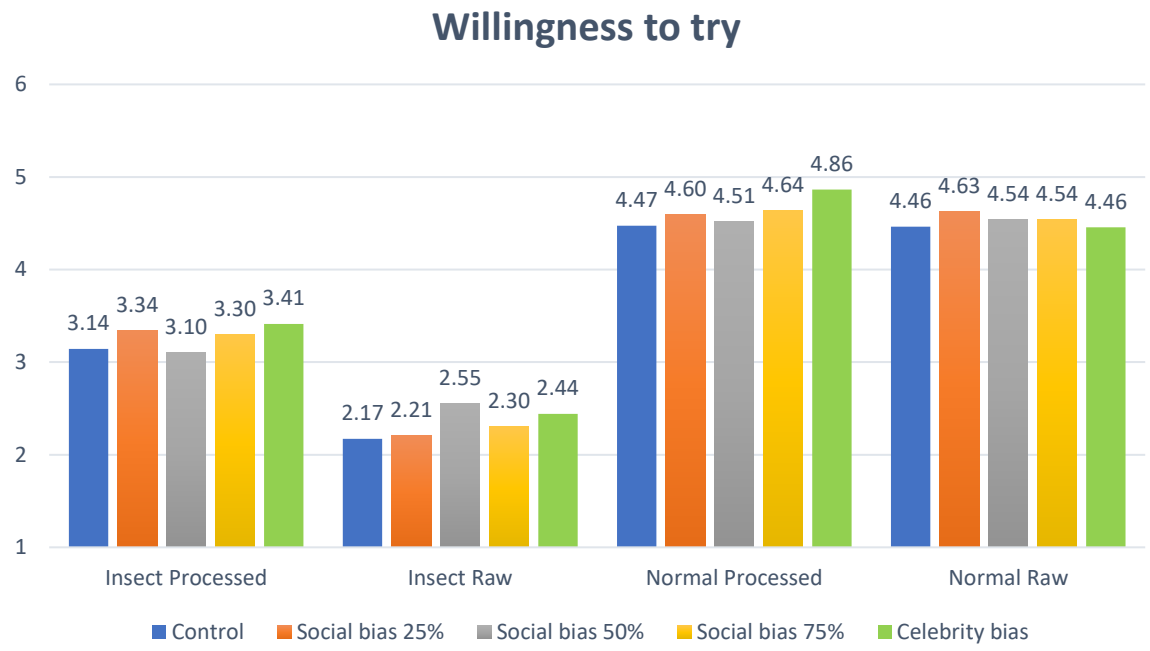
For the taste category, we can see in Graph 2 that the insect-processed foods have overall higher scores in all groups compared to the insect-raw products, with the highest score for insect-processed products being 3.26 and the highest for insect-raw products being 2.31, both of the highest scores belonging to the Celebrity Bias group. This clearly illustrates that insect-processed products are seen as tastier than insect-raw products by the participants. In comparison with the Control group, Celebrity Bias is once again the one with the highest scores. For insect-processed products, there is a decrease in the scores of the Social Bias 25% group and the Social Bias 50% group compared to the Control group. This is the same that was observed in Graph 1, quality expectations.



Graph 3. Comparison of appetizing scores of all groups.

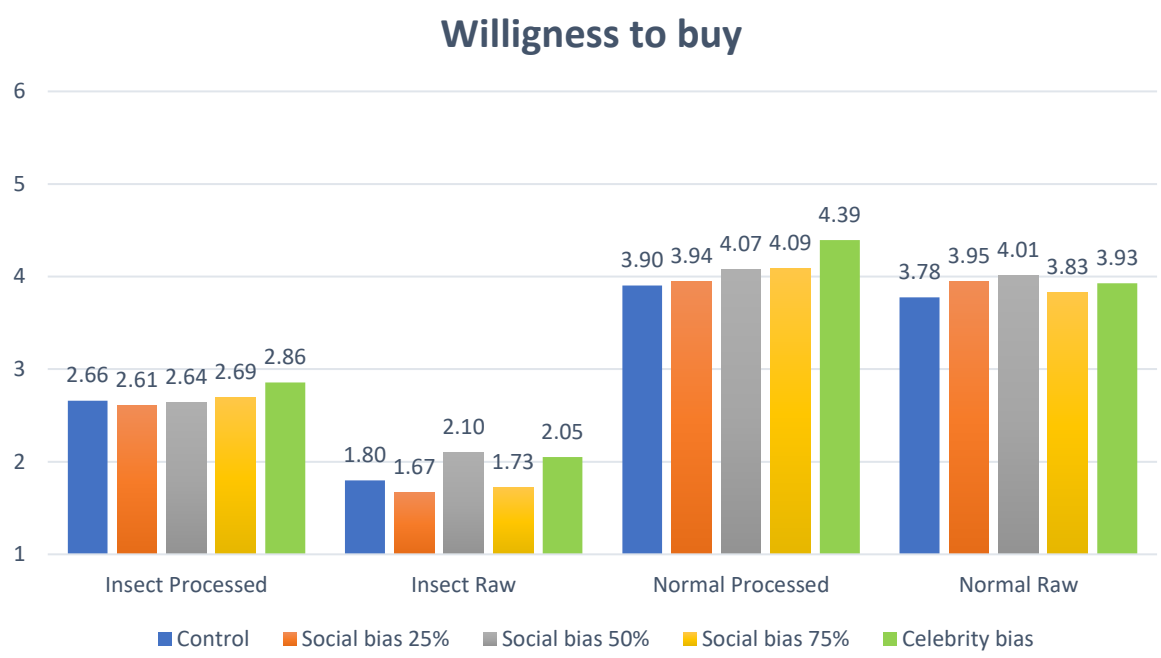
In Graph 3 a big score difference between insect-processed products and insect-raw products is observed again. Appetizing expectations scores for all groups go significantly down for insect-raw products, however, even with the scores being low, it is observed that the bias groups have score increases for most of the groups in comparison with the Control group, with the exception of the Social Bias 75% group, which goes down 0.06 points. In the case of insect-processed products, we again see some slight increases in comparison to the Control group. The increase is seen in all bias groups but the Social Bias 50% group, with a bigger decrease of 0.10.

It is noticeable that the biggest increase across all categories is shown here, in appetizing expectations. For the insect-processed products the Control group has a score of 2.82 and the Celebrity Bias group has a score of 3.21, making it a difference of 0.39 points.



Graph 4. Comparison of willingness to try scores of all groups.

Willingness to try scores are expressed in Graph 4. This category is the only one that has just one group showing a decrease in their score compared to the Control group, which is the Social Bias 50% group, for insect-processed products. All the other bias groups show an increase in their score for both insect-processed products and insect-raw products. In general, insect-processed products' scores are once again higher than insect-raw products' scores. Following the same trend as all categories, the Celebrity Bias group is the one with consistently highest scores compared to the Control group, with an equal increase of 0.27 in both insect-processed products and insect-raw products.



Graph 5. Comparison of willingness to buy scores of all groups.

The last category analyzed is the willingness to buy, this category holds the lowest scores for insect products along with the appetizing category. It is apparent in Graph 5 that for the insect-raw products, the scores of the groups Social Bias 25% and Social Bias 75% go noticeably low. The Social Bias 25% group has a 0.13-point decrease in comparison with the Control group, which is the biggest decrease in all categories and all groups for insect products. Breaking the usual tendency, for insect-raw products, the group that tends to decrease score in most categories, Social Bias 50%, increases by 0.30 points. This is an even higher increase than the one of the Celebrity Bias group, which tends to be the group with the highest increases across all categories for insect products.

For the insect-processed products, the only noteworthy increase is for the Celebrity Bias group, with decreases in the Social Bias 25% and Social Bias 50% group.

All in all, the Celebrity Bias group is the one with the highest increases in scores in comparison with the Control group of all categories of all insect products by one (insect-raw, willingness to buy). The Social Bias 50% group is the one that consistently decreases in all categories for all insect-processed products.

When an average for all the bias groups was obtained, it was noticed that the Celebrity Bias group scores were significantly lowered by the 3 Social Bias group scores. Therefore, it was decided to compare the Celebrity Bias group on its own, and make an average of the 3 Social Bias groups, to obtain more accurate results. This average of the Social Bias 25%, Social Bias 50% and Social Bias 75% will be now forward referred to as Social Bias average group.

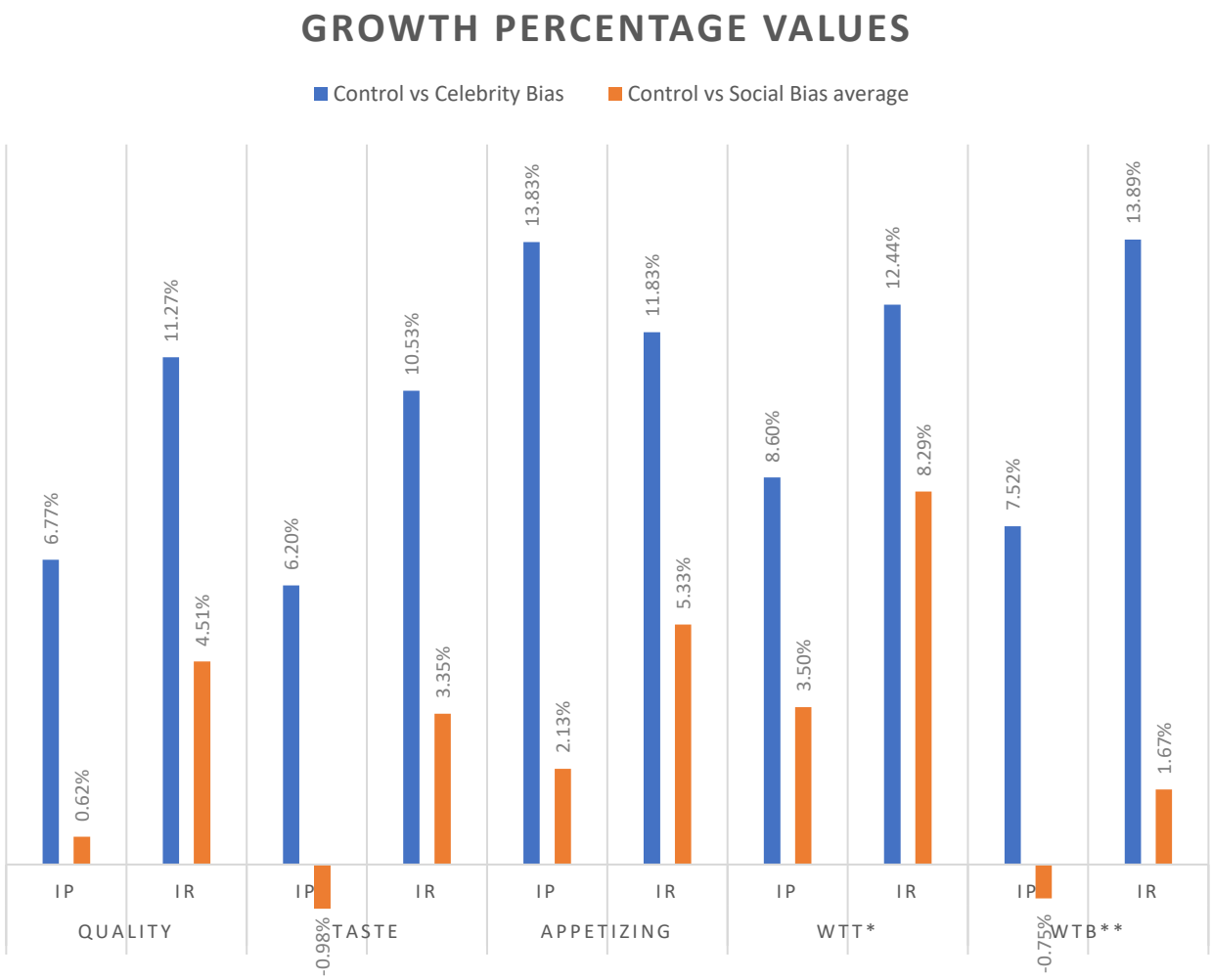
To calculate and compare the growth percentage between each group the following growth percentage formula is used.

$$\text{Growth Percentage} = \frac{New\ Value - Old\ Value}{Old\ Value} \text{ x } 100\%$$

For clearer data organization, the growth percentage values calculated were placed in Table 7. Here the Control group scores are compared with the Celebrity Bias group scores in the first column, and with the Social Bias average group in the second column. To calculate the growth percentage Control group scores were used as the old value, and the Celebrity Bias group scores and Social Bias average scores were used as the new value.

	Product type	*Control vs Celebrity Bias*	*Control vs Social Bias average*
Quality	Insect processed	6.77%	0.62%.
	Insect raw	11.27%	4.51%
Taste	Insect processed	6.20%	-0.98%
	Insect raw	10.53%	3.35%
Appetizing	Insect processed	13.83%	2.13%
	Insect raw	11.83%	5.33%
Willingness to try	Insect processed	8.60%	3.50%
	Insect raw	12.44%	8.29%
Willingness to buy	Insect processed	7.52%	-0.75%
	Insect raw	13.89%	1.67%

Table 7. Growth percentage values comparison.



Graph 6. Growth percentage values comparison.

**WTT= Willingness to try. *WTB=Willingness to buy. IP=Insect-processed. IR=Insect-raw.*

Graph 6 was made to highlight and simplify the visualization of the data of Table 7, this allows for a clearer comparison of the impact the different biases had on the participant's perceptions. At first glance, it is easy to identify that the Celebrity Bias group had the biggest growth, with the growth percentages being pretty consistent throughout the 5 different categories for both insect-processed and insect-raw products. The highest increase was for willingness to buy insect-raw products with a 13.89% growth, and appetizing expectation for insect-processed products with a very similar growth of 13.83%. The lowest growth was the taste expectation for insect-processed, with a growth of 6.20%, which is still a significant increase.

On the other hand, when comparing the Control group to the Social Bias average group, the growth percentage values are not as high. Most of the categories did increase, however, there is only one big increase in willingness to try for insect-raw products, at 8.29% growth. Besides this result, the highest growth percentage is around half of that, at 4.51% growth for the quality expectation of insect-raw products. It is worth mentioning, that while the Celebrity Bias group had consistent positive growth percentages, the Social Bias average group had 2 negative growth percentages, in taste expectation of insect-processed products at -0.98% and in willingness to buy insect-processed products at -0.75%.

Finally, there is a visible trend in both the Celebrity Bias group and the Social Bias average group where in all 5 categories the insect-raw products got a higher growth percentage than the insect-processed products.

4.3 Attitudes towards insect-based foods

Following the product questions section, participants were asked to reply to questions on their attitudes towards insect-based foods. For this, they had a 7-point Likert scale going from 1=Strongly disagree and 7=Strongly agree. It is important to notice the difference between the first 5 sentences, which are positive statements, and the last 3 sentences, which are negative statements. Therefore, a 1=strongly disagree for the first 5 statements would mean a negative response, as a 1=strongly disagree for the last 3 statements would mean a positive response.

The following subchapters are divided by the 5 different groups analyzed: Control, Social Bias 25%, Social Bias 50%, Social Bias 75% and Celebrity Bias. The data collected from each group is first presented and compared individually, to later compare each of the 4 bias groups to the Control group. Finally, the 4 most relevant statements related to the research questions and hypotheses are analyzed. The 7-point Likert scale responses were aggregated into: disagree, neutral, and agree for easier comprehension. The entire data of the responses can be found in Tables 13 to 27 in Appendix C.

4.3.1 Control

As more detailly explained in Chapter 3, the Control group had no article shown before the product questions. These baseline group results are compared with the 4 other groups' results, which had a psychological bias in the form of an article. Table 8

below shows the percentage of participants that chose each option in the Control group.

CONTROL

	Disagree	Neutral	Agree
I would eat insects every opportunity I have	76%	13%	10%
I would eat insects if available but not go out of my way	54%	9%	37%
I would eat insects only if there were no other food choices	38%	23%	39%
I would eat insects in the future	40%	18%	42%
I like insects and would eat them now and then	68%	22%	10%
	Disagree	**Neutral**	**Agree**
I don't like the taste, smell or texture of insects	15%	40%	46%
I do not like the appearance of insects	7%	4%	88%
I will never eat insects	46%	15%	40%

Table 8. Control group average responses.

Looking at each positive statement individually, it is noticeable that the statements that reflect strong willingness and proactivity towards trying insect foods score higher on the negative side of the scale. For the statement "I would eat insects at every opportunity I have" it can be seen in Table 8 that the disagree percentage is at 76% and the agree percentage is at 10%; meaning that overall, more participants disagree with this statement. On the other hand, the statements that reflect a more conditional and passive approach have more evenly distributed answers when compared to the more proactive statements. The more passive statement "I would eat insects in the future" has 40% disagree and 42% agree. This reflects that overall, the stronger willingness statements score more negatively and the more passive statements score more positively, or at least, more evenly than a complete rejection.

For the negative statements, a disagree would mean a positive opinion towards insect foods. For the first 2 statements, referring to disliking insects in general, disagree had the lowest percentages. The statement "I do not like the appearance of insects" reached a remarkable 88% of agree responses. However, for the last statement "I will never eat insects" the responses were more equally balanced between agree (40%) and

disagree (46%). This reflects that even though participants dislike the appearance of insects, there is a willingness to accept them in the future.

In the next subchapters, the different percentages for each of the 4 biased groups are analyzed. Again, the 7-point Likert scale responses aggregated into: disagree, neutral, and agree for easier comprehension. This approach allows for a more efficient comparison, rather than analyzing each statement at every level of the scale.

4.3.2 Social Bias 25%

For the Social Bias 25% group, participants were showed an article stating that 25% of Europeans are now eating insects as part of their regular diet. Table 9 shows the percentage of participants that chose each option in the Social Bias 25% group.

SOCIAL BIAS 25%

	Disagree	Neutral	Agree
I would eat insects every opportunity I have	84%	9%	6%
I would eat insects if available but not go out of my way	56%	6%	38%
I would eat insects only if there were no other food choices	41%	28%	31%
I would eat insects in the future	34%	13%	53%
I like insects and would eat them now and then	63%	31%	6%
	Disagree	**Neutral**	**Agree**
I don't like the taste, smell or texture of insects	25%	31%	44%
I do not like the appearance of insects	13%	3%	84%
I will never eat insects	53%	19%	28%

Table 9. Social Bias 25% group average responses.

When comparing the Control group to the Social Bias 25% the negative statements all have some increases in the disagree responses, which indicates a more positive opinion towards insects. The "I don't like the taste, smell or texture of insects" statement has an increase of 66.6%, "I do not like the appearance of insects" has an 85.7% increase and "I will never eat insects" has a 15.2% increase. Furthermore, the "I will never eat insects" statement agree response has a reduction of - 30%, which again indicates a positive opinion. The rest of the agree responses remain the same.

When looking at the positive responses, the only notable positive change is in the statement "I would eat insects in the future" with a 25.19% increase. On the other hand, the statement "I like insects and would eat them now and then" decreases in comparison to the Control group, indicating a more negative opinion towards insects. Overall, the 25% social bias article did not seem to have a notable influence on the responses.

4.3.3 Social Bias 50%

For the Social Bias 50% group, participants were showed an article stating that 50% of Europeans are now eating insects as part of their regular diet. Table 10 below shows the percentage of participants that chose each option in the Social Bias 50% group.

SOCIAL BIAS 50%

	Disagree	Neutral	Agree
I would eat insects every opportunity I have	82%	4%	14%
I would eat insects if available but not go out of my way	46%	14%	39%
I would eat insects only if there were no other food choices	46%	18%	36%
I would eat insects in the future	43%	14%	43%
I like insects and would eat them now and then	57%	29%	14%
	Disagree	**Neutral**	**Agree**
I don't like the taste, smell or texture of insects	32%	21%	46%
I do not like the appearance of insects	14%	7%	79%
I will never eat insects	46%	29%	25%

Table 10. Social Bias 50% group average responses.

For the positive statements, the Social Bias 50% has no visible positive changes when it comes to agree responses in comparison with the Control group. The statement "I would eat insects every opportunity I have" has an interesting change, both the disagree and the agree responses increase in comparison with the control group, having a big decrease of -69.23% in the neutral response.

A positive shift can be observed in the statement "I will never eat insects", with the agree response decreasing from 40% (Control) to 25% (Social Bias 50%). This -37% reduction indicates a more positive opinion towards insects. For the remaining 2 negative statements, both disagree responses increased, indicating again a more

positive opinion towards insects. The statement "I don't like the taste, smell or texture of insects" had an outstanding 113.33% increase, and "I do not like the appearance of insects" had an increase of 100%.

For the Social Bias 50% group, only the negative statements showed a notable change when compared to the Control group.

4.3.4 Social Bias 75%

For the Social Bias 75% group, participants were showed an article stating that 75% of Europeans are now eating insects as part of their regular diet. Table 11 below shows the percentage of participants that chose each option in the Social Bias 75% group.

SOCIAL BIAS 75%

	Disagree	Neutral	Agree
I would eat insects every opportunity I have	64%	27%	9%
I would eat insects if available but not go out of my way	41%	5%	55%
I would eat insects only if there were no other food choices	32%	18%	50%
I would eat insects in the future	36%	23%	41%
I like insects and would eat them now and then	68%	23%	9%
	Disagree	**Neutral**	**Agree**
I don't like the taste, smell or texture of insects	18%	59%	23%
I do not like the appearance of insects	9%	0%	91%
I will never eat insects	55%	5%	41%

Table 11. Social Bias 75% group average responses.

The Social Bias 75% group shows few changes. Particularly 2 positive statements have increases in agree responses. For instance, "I would eat insects if available but not go out of my way" goes from 37% to 55%, a 48.6% increase. The negative statements' disagree responses increase slightly. For "I will never eat insects" there is an increase of 19.5%, and for "I do not like the appearance of insects" there is a 28.57% increase in comparison with the Control group. The agree responses for "I don't like the taste,

smell or texture of insects" go down, with a decrease of -50%. Both of these changes in the negative statements indicate a more positive opinion towards insect foods.

4.3.5 Celebrity Bias

For the Celebrity Bias group, participants were showed an article stating that a famous actress is now eating insects as part of their regular diet. Table 12 below shows the percentage of participants that chose each option in the Celebrity Bias group.

CELEBRITY BIAS

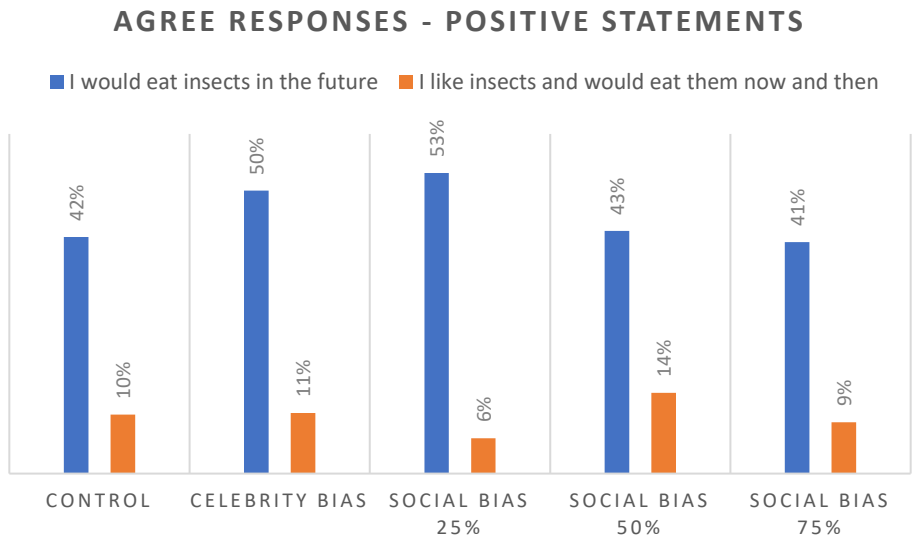
	Disagree	Neutral	Agree
I would eat insects every opportunity I have	79%	11%	11%
I would eat insects if available but not go out of my way	46%	18%	36%
I would eat insects only if there were no other food choices	57%	7%	36%
I would eat insects in the future	39%	11%	50%
I like insects and would eat them now and then	61%	29%	11%
	Disagree	**Neutral**	**Agree**
I don't like the taste, smell or texture of insects	25%	43%	32%
I do not like the appearance of insects	11%	7%	82%
I will never eat insects	54%	4%	43%

Table 12. Celebrity Bias group responses to attitudes towards insect-based foods statements.

In the positive statements, the Celebrity Bias group shows no notable changes in comparison with the Control group. Regarding the negative statements, there are some shifts, with all the disagree responses going up. "I don't like the taste, smell or texture of insects" disagree response goes up 66.6%, "I do not like the appearance of insects" disagree response goes up 57% and "I will never eat insect" disagree response goes up 17.3%.

Graphs 7 and 8 show a more detailed comparison analysis done focusing only on the agree responses of the 4 statements which directly align with the research questions and hypothesis. Graphs 14 to 17 in Appendix C show the comparison of each statement separately, with the 7-point Likert scale going from strongly agree to strongly disagree.

Out of the 4 statements chosen, 2 are negative and 2 are positive. These are "I don't like the taste, smell or texture of insects", "I will never eat insects", "I like insects and would eat them now and then" and "I would eat insects in the future". For the positive statements, an increase in "agree" directly correlates to a positive opinion towards insects as foods. However, for the negative statements "agree" will signify a negative opinion towards insects as foods.

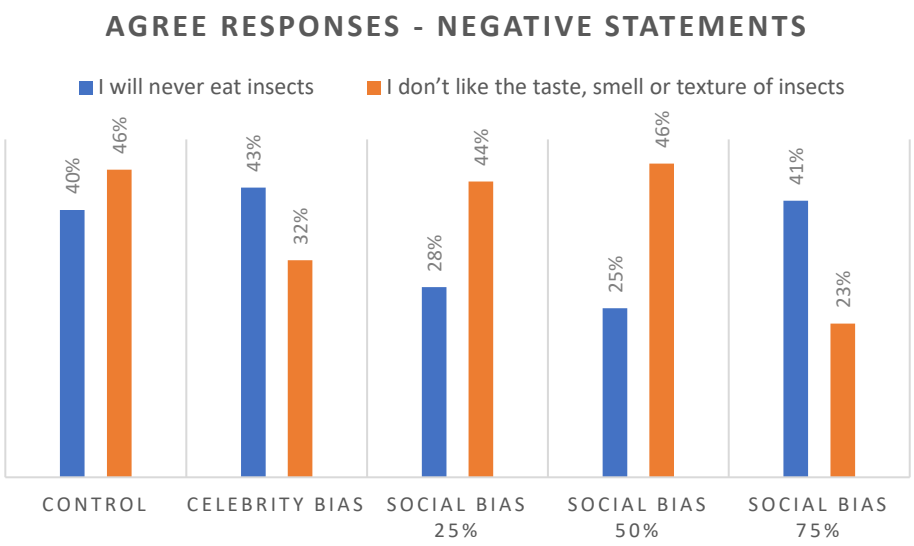


Graph 7. Comparison of agree responses of positive statements.

In Graph 7 for the statement "I would eat insects in the future" the highest agree response is for the Social Bias 25% group. In comparison to the Control group, there is a percentage growth of 26%. The second-best results are for the Celebrity Bias group. Overall, all groups but the Social Bias 75% have an increase, but not a very pronounced one.

The statement "I like insects and would eat them now and then" clearly has a lower percentage of agree responses in comparison with the first statement discussed. In this case, two groups go down, with Social Bias 25% having the biggest decrease, from 10% (Control) to 6%, a -40% decrease. The biggest increase is for the Social Bias 50% group, from 10% to 14%, a 40% increase.

All in all, the changes are small, and there seems to be no influence from the biased groups onto the consumer's perspective.



Graph 8. Comparison of agree responses for negative statements.

In the case of negative statements, the results appear to be more promising. In the analysis of negative statements, an agree response going down signifies a more positive opinion towards insects. For the statement "I will never eat insects" a decline in agree can be seen in the Social Bias 25% group and the Social Bias 50% group, with reductions of -30% and -37.5% respectively. There are also small increases for the Celebrity Bias group and the Social Bias 75% group. The statement "I don't like the taste, smell or texture of insects" has decreases in all groups but the Social Bias 50% group, which remains the same. The biggest decrease is for the Social Bias 75% group, with a remarkable reduction of -50%.

For the product questions section of the survey, the results of the Celebrity Bias group were the ones with the most notorious changes. However, regarding the attitudes towards insect-based foods section of the survey, the results do not show a very notorious difference for any of the groups in particular.

In summary, a trend emerges with all 3 negative statements. All the disagree responses increase for each one of the bias groups compared to the Control group, suggesting a more positive view towards insect foods. The Social Bias 50% has the biggest increase, 113.3% for the statement "I don't like the taste, smell or texture of insects". On the other hand, responses to positive statements seem to be overall unaffected by the bias presented, as no evident changes emerged when comparing them to the Control group.

Chapter 5

Discussion

The preceding literature review has provided a comprehensive examination of the historical, cultural, psychological, and market-related factors surrounding the acceptance of insect-based foods in Western societies. In this chapter, the implications of these findings are addressed and potential strategies for overcoming the barriers that have traditionally stalled the integration of entomophagy into Western diets are explored.

The Western market's resistance to embracing insect-based foods, despite their historical significance in various regions and cultures, is a complex phenomenon. This resistance is deeply rooted in perceptions of fear and disgust associated with entomophagy. As explored in the literature, Western aversion to insect consumption has contributed to the oversight of insects as a viable source of nutrition and sustainability in agricultural studies.

Understanding the psychological aspects of consumer acceptance is crucial. Food preferences, food neophobia, and the role of appearance in food acceptance have been highlighted as key factors influencing individuals' willingness to try novel foods. Furthermore, media portrayal has played a significant role in shaping public perception of insects, often depicting them as unsanitary or dangerous, further discouraging potential consumers.

This research goal was using the collected data to answer the following questions:

- Does psychological bias priming affect consumers' perception of insect-based food?
- Does psychological bias priming influence people's willingness to buy and try insect-based foods?
- To what extent does psychological bias priming affect people's attitudes towards insect-based foods?

In the following sections of this discussion, the data and results obtained will be gone over, exploring how they can answer the research questions and assess whether to confirm or refute the initial hypotheses.

5.1 Product questions

5.1.1 Impact on Quality Perceptions

Quality expectations play a key role in shaping consumers' purchasing decisions. If consumers have high-quality expectations for a product, they are more likely to choose that product over others. Conversely, low-quality expectations can deter consumers from making a purchase. This is why the collection of quality expectation data was considered.

The highest score obtained for the quality expectations section of the survey was 4.35 out of 6, for the normal raw product out of the Social Bias 25% group. When comparing the normal processed products to the insect-processed products scores, it is interesting to note that they are not that far from each other. For instance, in the Celebrity group, insect-processed products had a score of 3.47, which is somewhat close to the normal processed products for the same group at 4.16. This could indicate that even though consumers might not be ready to introduce insects into their diet, their quality expectations for insect-processed products are quite high.

Packaging is of high importance when considering consumers' expectations. The package of a product is the first contact a consumer has with it, and the one that creates the first impression (Wang & Chang, 2022). Things such as material, shape, color, size, etc. all affect the willingness to buy and product acceptance even after the sale (Rebollar et al., 2012). Therefore, a reason for the close scores between the two different processed products might be the packaging that the insect-processed products have. The products chosen for this category display a clean and elegant "white aesthetic" in most cases. Research shows that white space indicates trustworthiness, high quality, and enhances positive first impressions promoting beauty and clarity (Margariti, 2021). These packaging characteristics might give the participants a bigger sense of trust in the otherwise unknown products.

Furthermore, consumers' acceptance of insect-based foods tends to be lower when insects are visible on the packaging (Pozharliev et al., 2023) (Schösler et al., 2012). Most of the insect-processed products, with the exception of the cereal bar, mention the insects as an ingredient but do not show visible insects on their packaging. This is discernable from the data collected for the insect-raw products. Their scores are

considerably low when comparing them to the insect-processed products. As previously mentioned, the highest score for insect-processed products is 3.47, while the highest score for insect-raw products is 2.96, both in the Celebrity Bias group. In this case, it is not only the packaging, but the fact that insects are whole and visible, unlike in the insect-processed products where the insects are disguised into a more familiar product, such as pasta, burger patty or chips.

When examining the results on an individual group basis, the data presented in Graph 1 reveals some intriguing patterns. In the case of insect-raw products, all the bias groups exhibit a slight increase in their scores compared to the control group. While these increases are relatively modest, they signify a noteworthy shift in perception. The group that had the most positive opinions for quality expectations of insect products is the Celebrity group. This group's influence shows in both insect-processed products and insect-raw products. For the first, the growth percentage is 6.77%, for the latter, 11.27%. This means that the participants in the Celebrity group had higher quality expectations for insect products than the Control group, confirming the hypothesis (H1a) that psychological bias priming increases quality expectations. Moreover, insect-raw products had a bigger increase in all biased products overall, approximately a double growth percentage compared to insect-processed products. This highlights the potential for marketing strategies to use social proof to improve consumers' perceptions of insect-based foods and promote their acceptance.

Conversely, for insect-processed products, the Social Bias 25% and Social Bias 50% groups demonstrate a marginal decrease in their ratings compared to the Control group. This variation might be attributed to the differing percentages mentioned in the articles presented in Chapter 3 of this research. Notably, the articles in the Social Bias 25% and Social Bias 50% groups featured lower percentages of Europeans consuming insects compared to the articles in the Social Bias 75% group. This discrepancy in information could have influenced participants' perceptions and contributed to the observed variations.

It is worth highlighting that the Celebrity Bias group consistently stands out in terms of the most substantial increases in ratings, whether it pertains to insect-processed or insect-raw products. This suggests that the influence of celebrity endorsements on consumer attitudes towards insect-based products is particularly potent and merits further examination.

5.1.2 Impact on Taste and Appetizing Perceptions

Insects are perceived as disgusting in the Western hemisphere, this is one of the main reasons affecting their low consumption (Hamerman, 2016). Particularly, taste is one of the biggest barriers to insect consumption in Italians (Mancini & Antonioli, 2022) (Sogari et al., 2017). As a result, taste and appetizing level expectations are a big challenge to overcome when it comes to insect foods, as they are more directly related to eating the product. For instance, in the case of quality expectations, better results might be perceived for reasons such as packaging. A participant can more easily state that an insect product is of high quality, without necessarily seeing themselves eating the product. The quality opinion is certainly a more removed point of view that involves less direct interaction with the insects.

For taste and appetizing levels, food neophobia comes into play, and it affects consumers' responses directly. Amplifying this is the probable low, or inexistent, previous consumption of insects from the participants. This could make them reply from a place of fear to the unknown products without really considering what the insect-based foods might taste like. Research has shown that after tasting insect-based foods, attitude and intention improve (Menozzi et al., 2017), however, without previous experience, taboos and preconceptions play a big role.

In analyzing the results concerning taste preferences, we can discern some significant trends. As depicted in Graph 2, it is evident that insect-processed products consistently gathered higher scores across all participant groups when compared to insect-raw products. Specifically, the highest score recorded for insect-processed products reached 3.26, while the highest score for insect-raw products peaked at 2.31, with both of these highest scores attributed to the Celebrity Bias group. This clearly demonstrates a prevailing perception among participants that insect-processed products are more palatable than their raw counterparts.

Furthermore, when examining the influence of bias factors, particularly the Celebrity Bias group, it becomes apparent that this bias consistently yields the highest scores, once again affirming its significant impact. For this group, the percentage growths are 6.20% for insect-processed foods and 10.53% for insect-raw foods. There is a substantially higher increase for insect-raw foods than insect-processed foods, as it was observed in quality expectations as well. Meaning psychological biases could have a significant positive impact in the acceptance of insect-raw products, which are notoriously the hardest to introduce into westerners' diets.

Conversely, both the Social Bias 25% and Social Bias 50% groups exhibited lower scores for insect-processed products when compared to the control group, mirroring the observations from quality expectations, Graph 1.

These findings underscore the role of psychological biases, particularly Celebrity Bias, in shaping taste perceptions of insect-based products, emphasizing the importance of such biases in consumer attitudes and preferences.

When analyzing appetizing levels, the findings presented in Graph 3 reveal a significant disparity in scores between insect-processed products and insect-raw products, once again shedding light on the impact of processing on consumer perceptions. The scores related to appetizing expectations demonstrate a distinct decline when comparing insect-raw products scores to insect-processed products. Despite the generally low scores attributed to insect-raw products, it is noteworthy that the bias groups tend to exhibit score increases when compared to the Control group. An exception to this trend is the Social Bias 75% group, which experiences a slight decrease of 0.06 points.

Likewise, in the case of insect-processed products, there are once again slight score increases observed in comparison to the Control group. These increases are consistent across most bias groups, with the exception of the Social Bias 50% group, which shows a decrease of 0.10 points. This suggests that, regardless of the biases introduced, participants tend to hold slightly more favorable appetizing expectations for insect-processed products.

What stands out prominently in these results is the substantial increase in scores for the Celebrity Bias group when compared to the Control group. For insect-processed products, the Celebrity Bias group registers a 13.83% percentage increase, one of the highest for insect-processed products, and the insect-raw product has an 11.83% percentage increase. This considerable increase underscores the potent influence of psychological biases, especially celebrity endorsements, on participants' appetizing expectations when evaluating insect-based products.

These results confirm that psychological bias priming biases shape taste and appetizing expectations for insect-based foods, accepting hypotheses H1b and H1c.

5.1.3 Impact on Willingness to Try and Buy

Willingness to try and buy are directly connected to consumer behavior, and it is perhaps one of the most important attitudes to look into, as they could more clearly indicate the consumers' intention of eating insect foods, rather than just having a detached opinion on them as they could with quality or taste. Nevertheless, it is also noted that the willingness to try and buy of consumers does not necessarily translate into adopting the novel products into their daily diet, which would be the ultimate goal.

Research indicates that perceived social norm significantly influences Western consumers' willingness to either accept or reject the consumption of insects (Jensen & Lieberoth, 2019). This aligns with the data obtained on this study.

The insights gathered from the data presented in Graph 4 shed light on participants' willingness to try insect-based products, a crucial aspect of consumer behavior and adoption. Notably, this category stands out as the only one where just one group exhibits a decrease in their score compared to the Control group, the Social Bias 50% group, but only for insect-processed products. For all other bias groups, both insect-processed and insect-raw products show increased willingness to try.

Within this context, the Celebrity Bias group consistently emerges as the frontrunner, showing the highest scores in comparison to the Control group. The Celebrity Bias group's willingness to try has a growth percentage of 8.60% for insect-processed products and a 12.44% growth for insect-raw products, demonstrating the robust influence of celebrity endorsements in stimulating consumer interest and openness to trying insect-based foods.

As explored in the literature review, reducing the insect-like appearance on packaging reduces disgust and increases willingness to try (Menozzi et al., 2017). Consistently aligning with the observed trends in previous categories, the scores for insect-processed products surpass those of insect-raw products in the willingness to try category. This recurring pattern underscores the positive impact of processing and non-visible insects on participants' willingness to explore insect-based options.

Arguably the most challenging category to get positive scores in is the willingness to buy, as there are several reasons consumers might be drawn to trying insect-based foods, such as excitement for the unknown, trying something new and overall

curiosity. However, this does not mean that they would be interested in paying for them to routinely consume them (House, 2016).

The analysis of participants' willingness to buy insect-based products, as depicted in Graph 5, provides intriguing insights into consumer buying intentions of insect-based foods. This category stands out for its dissimilar dynamics compared to the previous ones.

In examining the willingness to buy, it is apparent that the psychological biases resulted in varying effects on their purchasing tendencies. For instance, in the case of insect-raw products, the groups exposed to Social Bias at 25% and 75% display notably lower scores compared to the Control group. Specifically, the Social Bias 25% group experiences a decrease of 0.13 points compared to the Control group, marking the biggest decline across all categories and groups for insect products. In contrast, the Celebrity Bias group and the Social Bias 50% group show substantial increases in the willingness to buy insect-raw products.

Interestingly, the Social Bias 50% group, which generally exhibits decreasing scores across most categories, breaks this pattern in the willingness to buy category, demonstrating a substantial increase of 0.30 points for insect-raw products. This increase surpasses even that of the Celebrity Bias group, which otherwise registers the highest increases in all other categories for insect products.

For insect-processed products, the only notable increase is once again the Celebrity group, with an increase of 0.20 points. Otherwise, the scores stay uniform across all groups. With small decreases for the Social Bias 25% (0.05) and Social Bias 50% (0.02) groups, and an increase for the Social Bias 75% group (0.03).

Despite the decreases, the Celebrity Bias group once again shows promising percentage growth, with a 7.52% increase in insect-processed products and a 13.89% increase in insect-raw products. When comparing these results to the Social Bias average group, the increases in the Celebrity Bias group become even more evident. Insect-processed products have a decrease of -0.75% and insect-raw products have a 1.67% increase. As previously mentioned, this is the most challenging category as it is closely related to consumers having a proactive attitude towards the products, therefore, such increases for the Celebrity Bias group are quite remarkable.

In summary, exposure to psychological bias priming amplifies consumers' willingness to try and buy insect-based foods, affirming hypotheses H2a and H2b.

5.1.4 Conclusion on Impact on Quality, Taste, Appetizing, Willingness to Buy and Try

In general, all the bias groups score higher than the Control group, however, the Celebrity Bias group consistently emerges as the one with the most substantial score increases across all categories of insect products. There is a notable exception in the willingness to buy category for insect-raw products, where the Social Bias 50% has the biggest increase, though the Celebrity Bias group still presents an increase. The consistent improvement in all response categories across various bias groups strongly substantiates that the influence of Celebrity Bias was a significant factor in shifting consumer perceptions, emphasizing the validity of the results. This steady increase is even more remarkable considering that the participants were only exposed to a very short article for a limited amount of time. Therefore, longer exposure or articles coming from more trusted sources could have an even bigger positive impact on consumers' perceptions of insect-based foods.

Furthermore, there is also a trend observed for the Social Bias 75% group. Even though the increases are less evident, the scores of this group consistently go up for all categories for insect-processed products, as well as 3 out of 5 categories for insect-raw products. On the contrary, the Social Bias 50% group consistently experiences score decreases across all categories for insect-processed products. The Social Bias 25% group shows increases and decreases across all groups, therefore showing no noteworthy influence.

The article presented to participants stated that 25%, 50% and 75% of Europeans are now consuming insects in their daily diets, each group divided by a different percentage of European consumers. When comparing the results of these 3 groups, we can assume that the reason the Social Bias 75% had more influence than the rest, is that the percentage of European consumers for this group is considerably larger. These findings highlight the complex interplay of biases in shaping consumers' perceptions and intentions regarding insect-based food products.

5.2 Impact on Attitudes towards Insect-based Foods

For this part of the investigation, the aim was to understand the extent to which social proof priming influences individuals' attitudes towards novel foods, particularly insect foods. The research question (RQ3) and hypotheses (H3a, H3b, H3c) guided the study of the impact of social proof on consumer attitudes. To summarize the key

findings, varying degrees of influence on participants' attitudes were observed, though the overall impact of social proof priming appeared somewhat limited.

Contrary to the initial hypotheses, the results suggest that the effects of social proof priming on attitudes toward insect foods were not as pronounced as anticipated. While the expectation was that exposure to social proof would lead to significant shifts in attitudes, the findings show a more nuanced picture.

Our analysis of positive statements revealed mixed results. Some participants showed an increased willingness to try insect-based foods after exposure to social proof, while others remained hesitant. For instance, the statement "I would eat insects in the future" saw a notable increase in agreement in the Social Bias 25% group. However, the statement "I like insects and would eat them now and then" showed a decrease in agreement in several groups, including the Celebrity Bias group.

Surprisingly, exposure to social proof had a bigger impact on participants' responses to negative statements about insect foods. Although there were slight decreases in agreement with statements like "I will never eat insects," these changes were not consistently noteworthy across all groups. However, a discernible pattern emerges in relation to disagreement with the negative statements. Across each of the bias groups, there is a constant increase in disagree responses when compared to the Control group. This shift implies a more favorable perspective toward insect-based foods. Notably, the Social Bias 50% group exhibits the most significant increase, with a remarkable 113.3% rise in disagreement with the statement "I don't like the taste, smell, or texture of insects." This observation suggests that it may be more challenging to positively influence pre-existing opinions regarding insects than it is to mitigate the negativity associated with them.

Unlike the product questions section of this study, where the results showed a clearer influence of the bias, particularly the Celebrity Bias group, this section did not exhibit major changes. Comparing the responses of the Control group, which received no bias article, with those exposed to different levels of social bias or celebrity influence, the differences were not consistently substantial. This suggests that social proof, as presented in our study, may not be a dominant factor in shaping consumer attitudes toward insect foods when presented with direct statements regarding their opinions.

It is possible that when consumers see statements regarding the consumption of insects, without accompanying images of the products they may initially respond

with apprehension due to the unfamiliarity of the concept, or cannot even imagine these products at all. Their initial reactions might be influenced by fear of the unknown, common taboos or preconceived notions associating insect consumption with extreme poverty or lack of education.

However, when presented with actual insect products, the unfamiliarity and fear surrounding the idea might diminish. The sight of these products may prompt consumers to recognize their presence in the Western world, gradually entering mainstream markets. This exposure to the products can also diminish the idea that such products are intimidating, unsanitary, or associated with economic disadvantage. Therefore, this could be one of the reasons that the most promising results were the ones where the participants could see the insect products.

5.3 Marketing and Promotion Insights: Research vs. Literature

The results and the Literature Review findings offer valuable insights for the marketing and promotion of insect-based food products. Particularly leveraging the power of celebrity endorsements could prove highly effective in enhancing consumer perceptions and trust.

The Celebrity Bias group's responses indicate that celebrity endorsements can have a significant impact on consumers' attitudes toward insect-based foods. This suggests that companies in the insect-based food industry might benefit from partnering with well-known figures to promote their products, potentially increasing consumer acceptance and willingness to try. Collaborations with chefs, restaurants, and food influencers who can create appealing insect-based dishes and promote them to a wider audience can be considered. Partnerships with food-related events or festivals could also help raise awareness and acceptance.

The differences in responses among the bias groups highlight the importance of tailoring marketing messages to specific segments of the target audience. For instance, consumers exposed to social bias articles responded differently based on the presented statistics (25%, 50%, or 75%). Therefore, companies should consider segmenting their marketing efforts and messages based on the level of social acceptance highlighted in their campaigns. This aligns with Jensen & Lieberoth, (2019) research, which found that perceived social norms play a substantial role in Westerners' disposition to try insects.

The study's findings emphasize the role of social norms in shaping consumer attitudes. Marketing strategies could leverage the concept of peer influence and social acceptance by showcasing testimonials, reviews, and user-generated content, to build a positive online community around these products that demonstrate how others have embraced insect-based foods.

As discussed more in-depth in the literature review chapter, availability and convenience are two of the most essential steps to introduce insect-based products into consumers' diets. Their availability at everyday stores can help normalize them and slowly familiarize individuals with the products. Despite the positive impact of biases on consumers' attitudes and results showing that participants are willing to eat insects in the future, some negative perceptions are also revealed, particularly related to taste, appearance and texture. Marketing campaigns should emphasize the sensory experience of consuming insect-based products, using descriptive language, visuals, and multimedia content to create an appealing sensory narrative.

Research points out that several exposures increase the willingness to try insect-based foods (Hartmann et al., 2015; Lensvelt & Steenbekkers, 2014; Ordoñez López et al., 2023), and even just one exposure can lead to higher acceptance of insect-based products afterward (Le Goff & Delarue, 2017). Therefore, a good approach to overcome the initial rejection could be offering consumers the opportunity to sample insect-based products in-store or at events.

Consumers' trust in the safety and quality of insect-based foods is essential. As this research shows, participants already have high-quality expectations for insect-processed foods. These insights can be further exploited through marketing efforts including transparency about sourcing, processing methods, and quality standards. Companies could consider using quality certifications or highlighting production standards in promotional materials.

The study clearly revealed that insect-processed products were generally perceived more favorably than insect-raw products. Marketers can emphasize the processing methods, such as cooking or flavoring, to enhance the taste and appeal of insect-based foods. Furthermore, this already positive opinion on insect-processed foods could be used as a stepping stone for the promotion of insect-raw products. Research indicates willingness to eat unprocessed insects increases after a positive eating experience with processed insects (Hartmann & Siegrist, 2016).

Understanding consumers' preferences and biases can guide product development efforts. Companies can use this information to create insect-based products that align with consumer expectations regarding taste, quality, and overall appeal.

Interestingly, while analyzing the data, a trend was recognized that might be of help to producers. The packaging of most insect-processed foods had clean and white colors, and this could have influenced the participant's high-quality expectations (Margariti, 2021). Furthermore, it was observed that most of the insect-raw products had green on their packaging, this could be helpful as health concerns and sustainability are the main driver to try insect-based foods, and research shows that green color is perceived as healthy (Huang & Lu, 2015).

Lastly, food literacy plays a big role. A main barrier to insect consumption for Italians is the idea that food safety is not guaranteed (Cicatiello et al., 2016). Providing information about the health benefits, sustainability, and nutritional value of insect-based foods can help build trust.

Given that some negative perceptions remained even in the Celebrity Bias group, launching educational campaigns to address common misconceptions about insect-based foods can be useful. As pointed out in the literature review chapter, Italians have limited knowledge and exposure to entomophagy (Balzan et al., 2016).

Highlighting the environmental sustainability of insect-based foods, such as reduced carbon footprint and resource efficiency, as well as the nutritional benefits of insects could appeal to environmentally and health-conscious consumers. In fact, individuals who believe in the health benefits of insects, plus the sustainability behind their production, are more willing to eat insect-based foods (Ordoñez López et al., 2023). Therefore, a good marketing strategy is to stress the positive impact of choosing insect-based options on the planet.

Chapter 6

Conclusion, Limitations and Further Research

6.1 Conclusion

In the search for understanding the factors that can influence the acceptance of insect-based foods in Western societies, this thesis explored the role that psychological biases could have in consumer perception. Through a carefully designed experiment involving five distinct groups subjected to varying forms of psychological bias—ranging from social endorsements to celebrity influence—a deeper insight into consumer perceptions of insect foods was examined.

The findings of this research revealed the considerable influence psychological biases have in shaping consumer perspectives. In comparison to the Control group, participants exposed to psychological biases exhibited clear shifts in their expectations towards insect foods.

First and foremost, participants under the influence of psychological biases consistently perceived insect-based foods as of higher quality, tastier and more appetizing. Furthermore, the biases increased the willingness among participants to both try and purchase insect food products. The Celebrity Bias group, in particular, emerged as the group most significantly influenced by psychological bias, with the Social Bias 75% group being second. The Social Bias 25% group exhibited the least pronounced changes, while the Social Bias 50% showed more negative results.

These findings carry significant implications for the introduction and promotion of insect-based foods within Western societies. By strategically leveraging these biases, businesses and policymakers can potentially expedite the process of popularizing insect-based foods as sustainable and nutritious dietary choices. The insights gained from this research offer an intriguing complement to existing literature on consumer acceptance of insect-based products.

However, it is important to acknowledge the limitations of this study, including the specific biases introduced in the experimental design, the exposure time, and the sample size. Future research endeavors can build upon these findings by exploring additional psychological factors and refining experimental methodologies.

In closing, as population grows so does the urgent need for sustainable food sources, and the acceptance of insect-based foods stands as a promising solution. This thesis has contributed to the comprehension of the intricate interplay between psychology and consumer choices, offering a valuable perspective for promoting entomophagy. With further exploration and innovation, the integration of insect-based foods into Western diets may soon become not merely a curiosity but a diet staple. In doing so, we embark on a path towards sustainability, nutrition, and a more harmonious coexistence with our environment.

6.2 Limitations

The limitations that can be recognized in this study are a few. Firstly, the sample size was limited, even though the initial collection was 336 participants. From that number, incomplete answers were removed. The final sample size was 268 participants. When divided into the 5 different groups, half of the participants were in the Control group (134), leaving the rest of the 4 bias groups with a very small sample size. Furthermore, the participants were mostly female (73%), and as discussed in the literature review, males tend to have more positive opinions towards insect-based foods.

Another limitation is the survey design, as the Likert scale used might not capture the full complexity of participants' attitudes and behaviors towards insect-based foods, potentially oversimplifying their responses. Furthermore, for the product questions, the insect products were all foreign products, with the words in a language they might not understand. This could have affected the consumers' perception of the products, as the unfamiliarity might have been raised and they could potentially trust Italian products more.

While the study focused on psychological biases, it did not explore other potential factors influencing consumer perceptions of insect-based foods, such as personal dietary preferences or environmental concerns. The study's design may not account for long-term changes in consumer attitudes or behaviors, as it primarily assesses immediate reactions to the biased articles.

Participants were exposed to a single article with a psychological bias. In reality, consumers are continually exposed to various sources of information and may not be as easily influenced as the study suggests. Furthermore, it is impossible to be certain that the participants did in fact read the articles with the psychological biases. Finally,

the article had no cited sources, and the participants were unable to verify the veracity of them. This could have affected their perceptions and responses based on the hypothetical scenarios. Real-world consumption decisions may differ from the responses obtained in a survey.

6.3 Future Work

Future studies could explore the long-term dynamics of consumer attitudes towards insect-based foods through longer-term research, examining how perceptions evolve over time and identifying factors that influence sustained acceptance or rejection. To gain a deeper understanding of consumer behavior in real-world settings, researchers may conduct observational studies in retail environments or restaurants, offering insights into actual purchasing decisions and consumption patterns.

Sustainability messaging could also be considered, as it is increasingly important in food choices. Researchers can explore how sustainability-related information influences consumer perceptions of insect-based foods, given the growing emphasis on eco-friendly and ethical considerations. Furthermore, when it comes to novel foods, consumers experience anxiety and distrust towards unfamiliar products. To gain consumers' trust, potential policy implications related to the promotion of insect-based foods should be assessed, taking into account regulatory frameworks and food safety standards.

Lastly, the influence of online and offline sources of information, including social media, traditional media, and peer interactions, on consumer perceptions could be explored in detail to determine the sources with the most impact.

These future research directions can provide valuable insights into the complex landscape of consumer perceptions of insect-based foods and inform strategies for promoting sustainable and alternative protein sources.

Appendix A

The survey was conducted in Italian. The original survey questions as well as the English version, for reference purposes only, can be found at the following page:

https://psicologiapd.fra1.qualtrics.com/jfe/form/SV_9Z6LxnybA9slYfI

Appendix B

Product images used in the survey, divided by category:

- Insect-processed products (no visible insects)

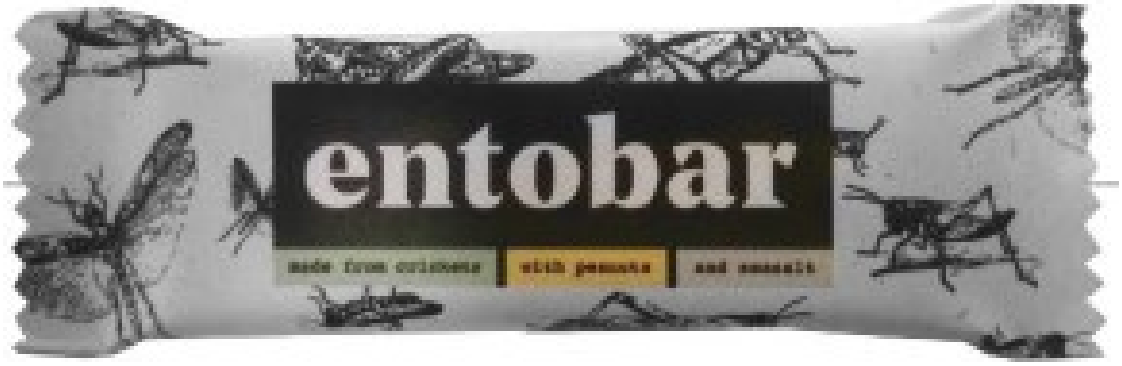


Image 10. Cereal bar made from crickets

Image 11. Burger patties made with insects

Image 12. Chocolate chip cookies made with crickets

Image 13. Potato chips made with insects

Image 14. Tagliatelle pasta made with insect flour

- Insect-raw foods (visible insects):

Image 15. Whole roasted grasshopper snack

Image 16. Whole roasted mealworms

Image 17. Whole roasted cricket snack

Image 18. Whole roasted crickets

Image 19. Roasted buffalo worm snack

- Normal processed products:

Image 20. Chocolate chip cookies

Image 21. Cereal bar with fruit

Image 22. Wheat spaghetti

Image 23. Potato chips

Image 24. Chicken burger with quinoa and vegetables

- Normal raw foods

Image 25. Raw indo-pacific shrimps

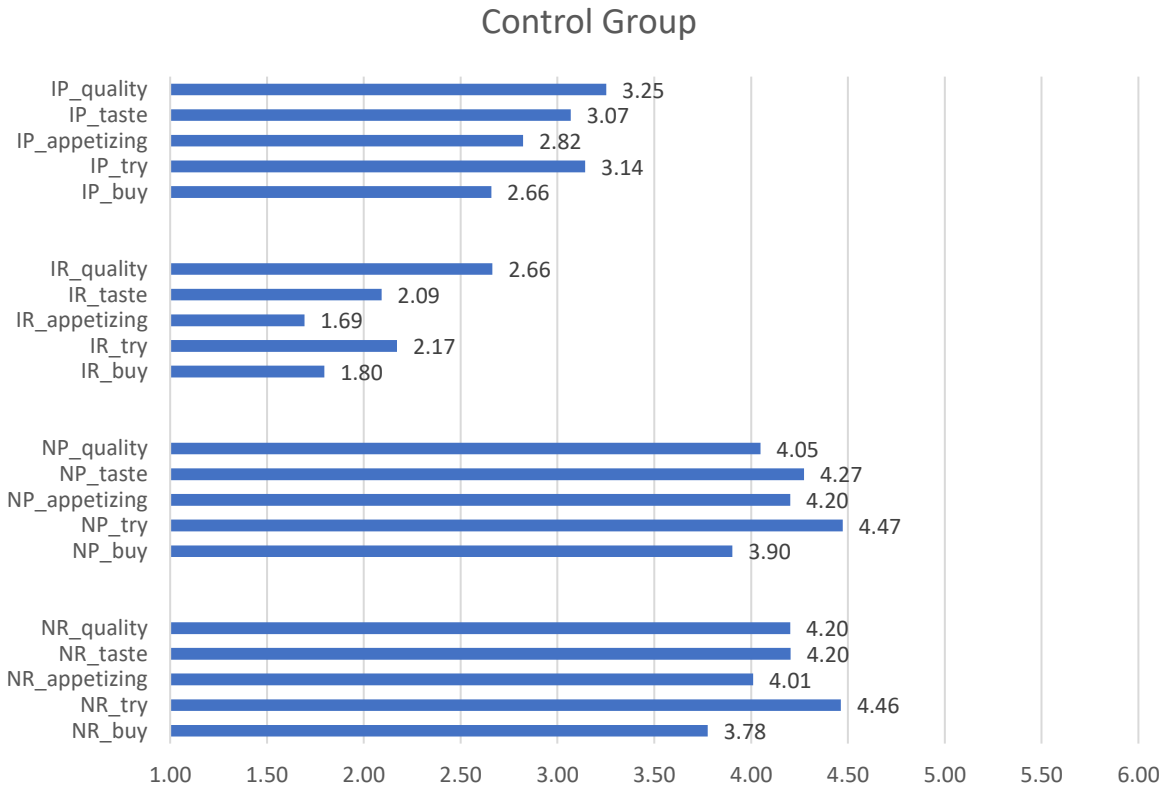
Image 26. Raw beef

Image 27. Dried apples

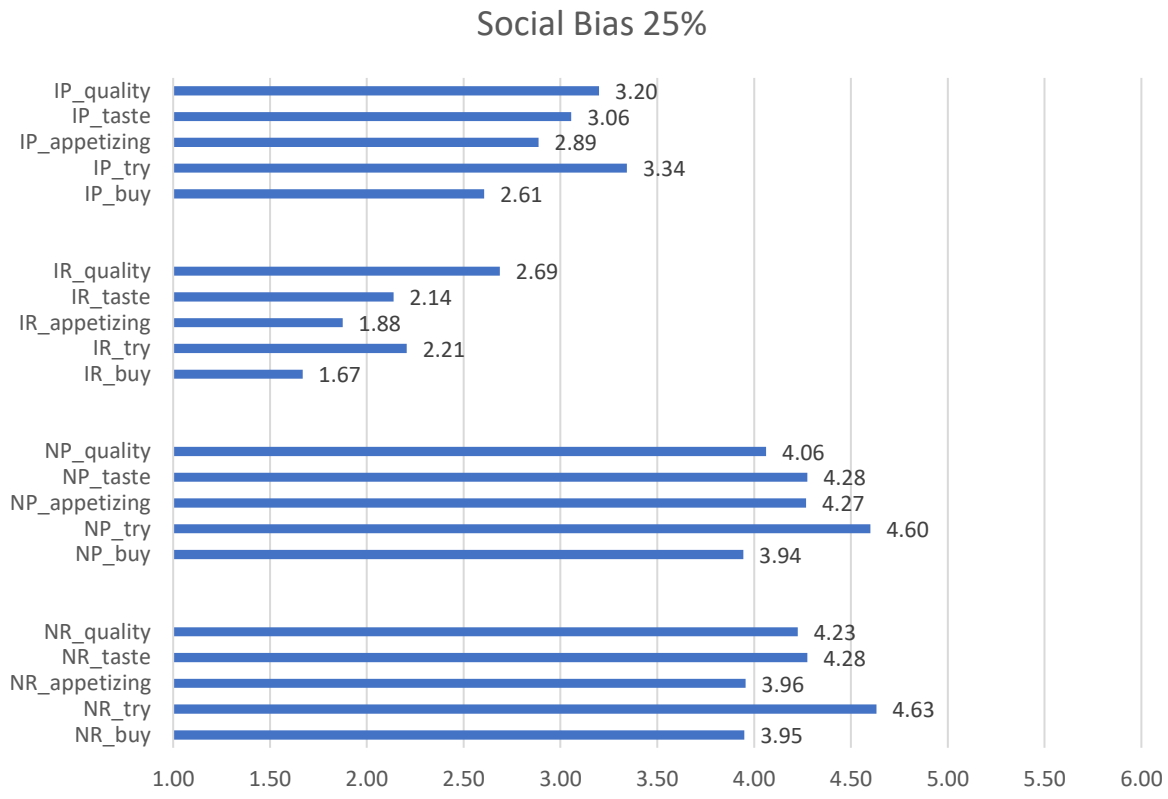
Image 28. Peanuts

Image 29. Baby-cut carrot

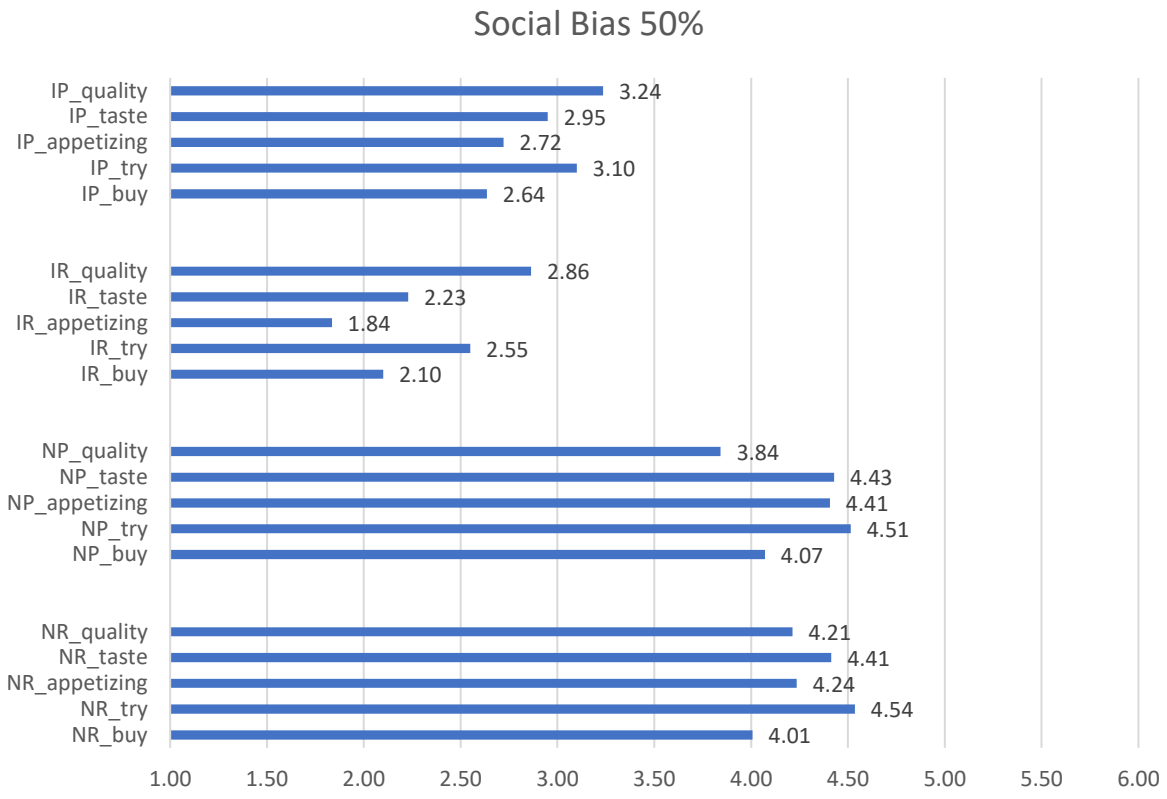
Appendix C



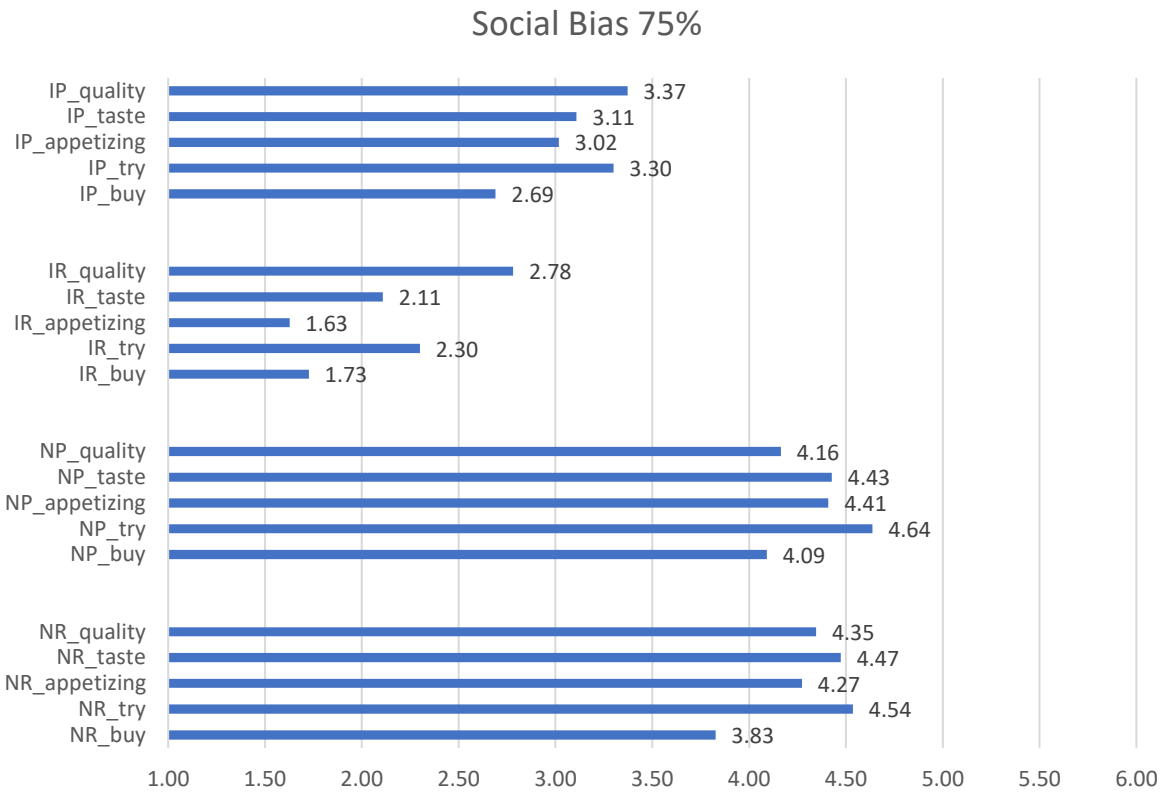
Graph 9. Control group responses IP: Insect-processed- IR: Insect-raw - NP: Normal Processed - NR: Normal Raw.



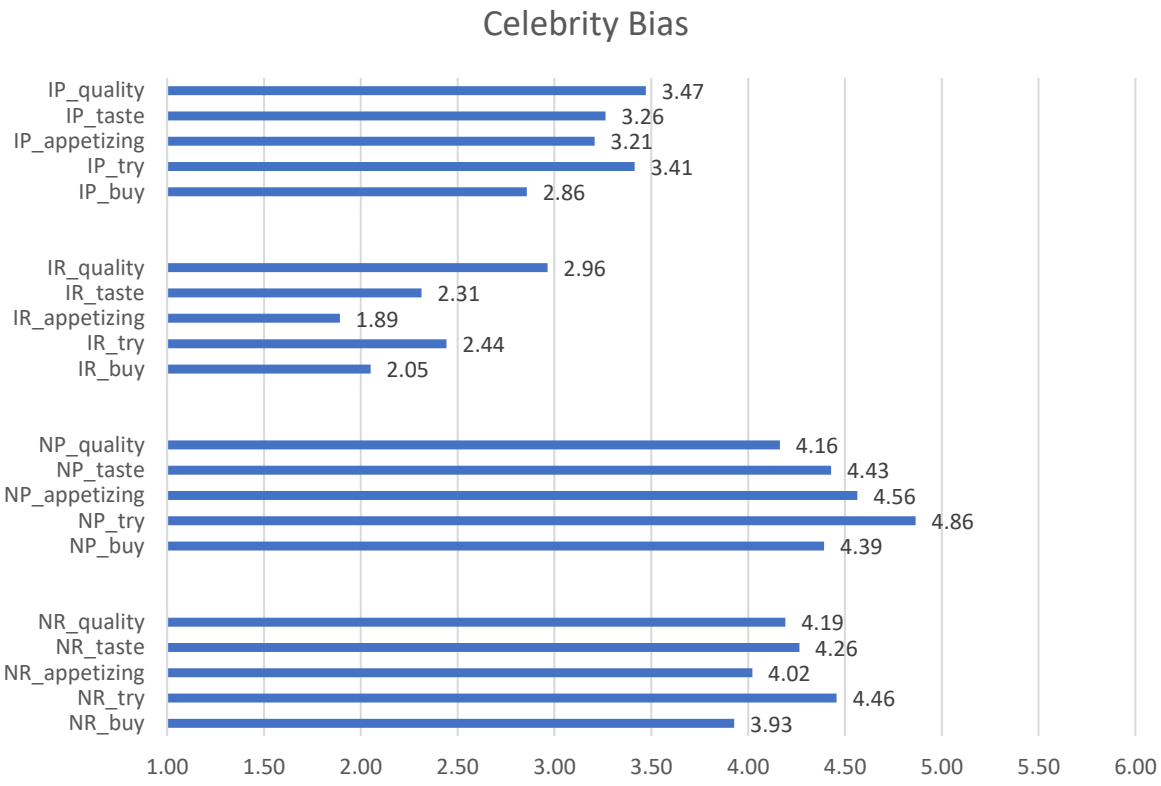
Graph 10. Social Bias 25% group. IP: Insect-processed- IR: Insect-raw - NP: Normal Processed - NR: Normal Raw.



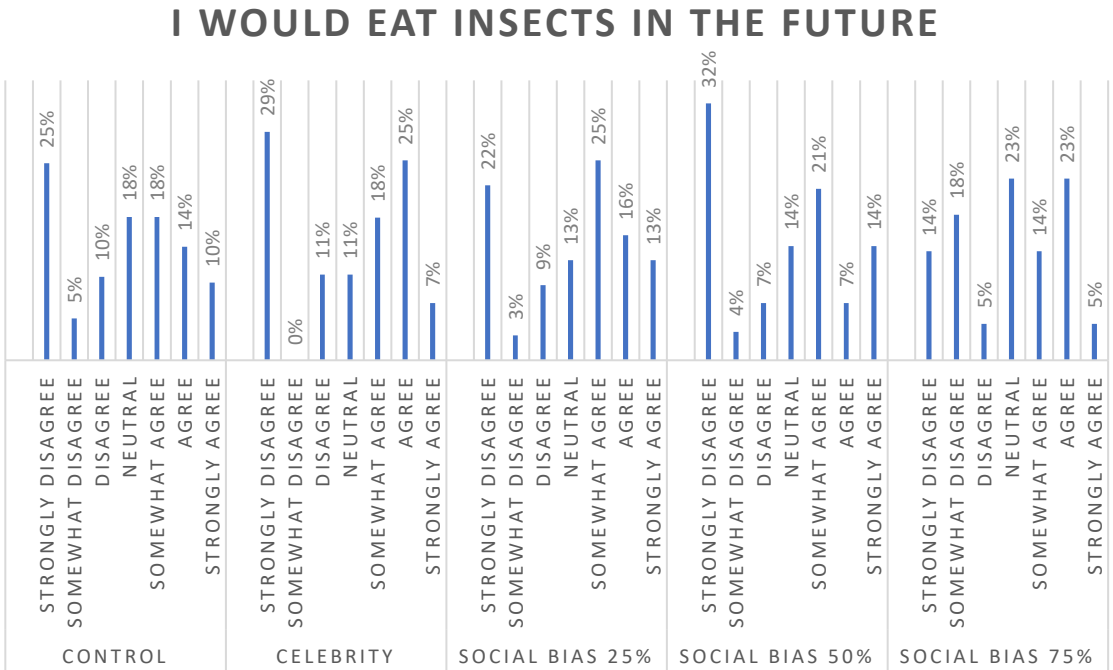
Graph 11. Social Bias 50% group. IP: Insect-processed- IR: Insect-raw - NP: Normal Processed - NR: Normal Raw.



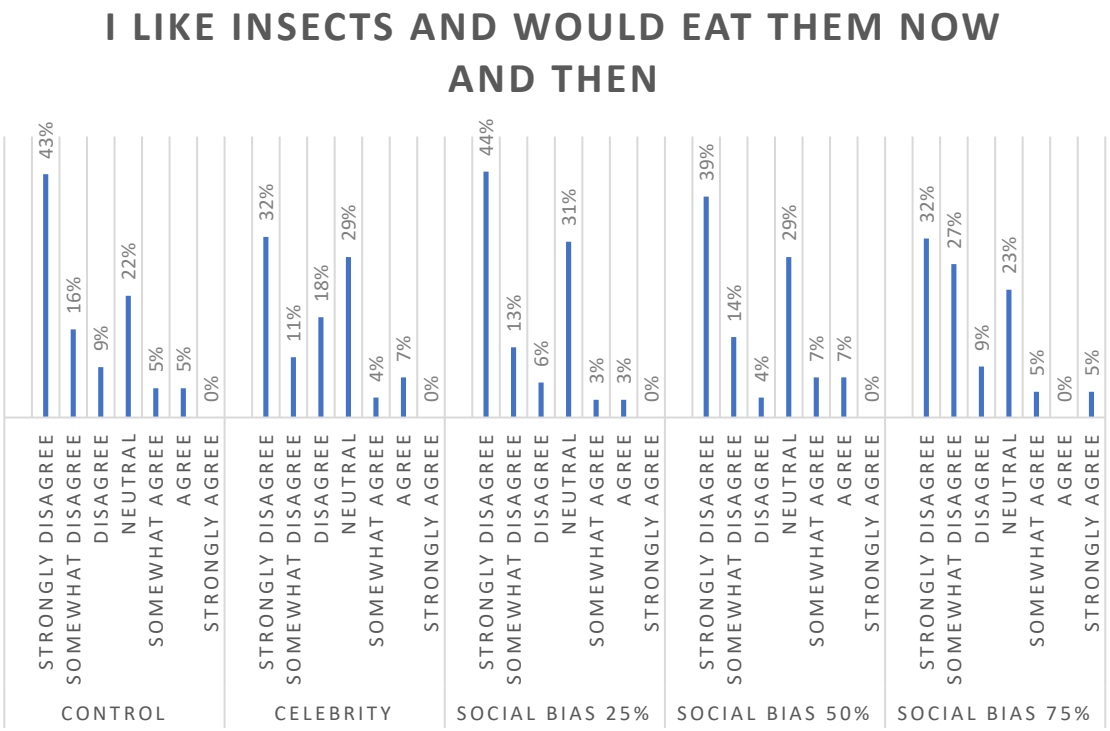
Graph 12. Social Bias 75% group responses. IP: Insect-processed, IR: Insect-raw, NP: Normal Processed, NR: Normal Raw.



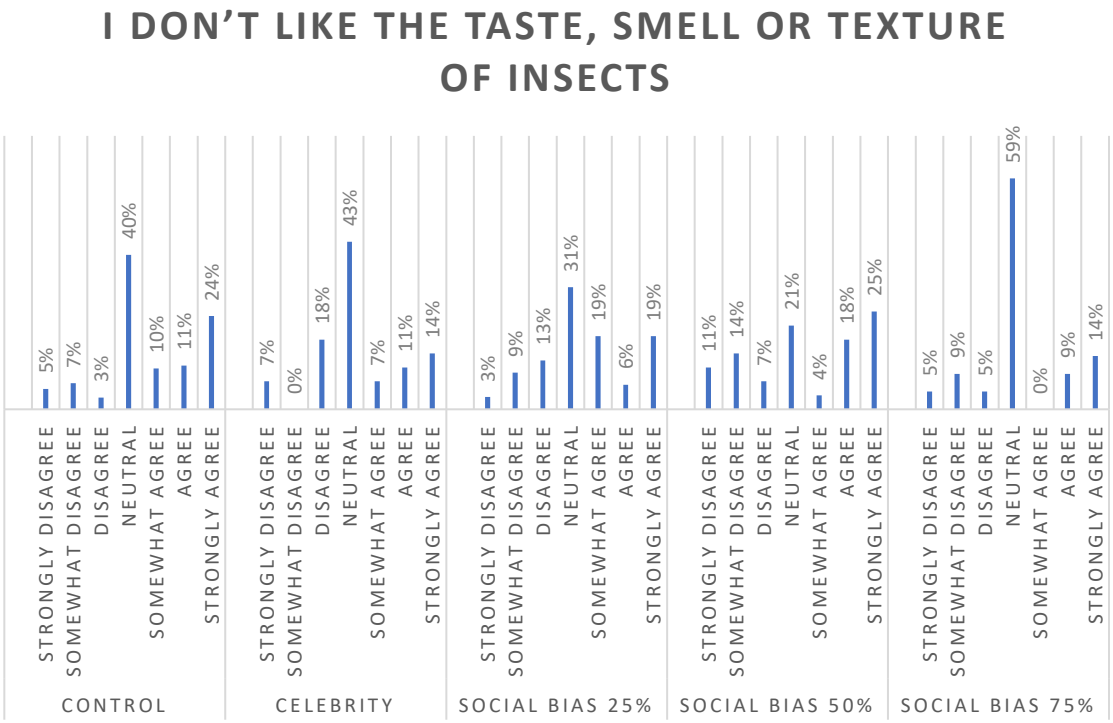
Graph 13. Celebrity Bias group responses. IP: Insect-processed, IR: Insect-raw, NP: Normal Processed, NR: Normal Raw.



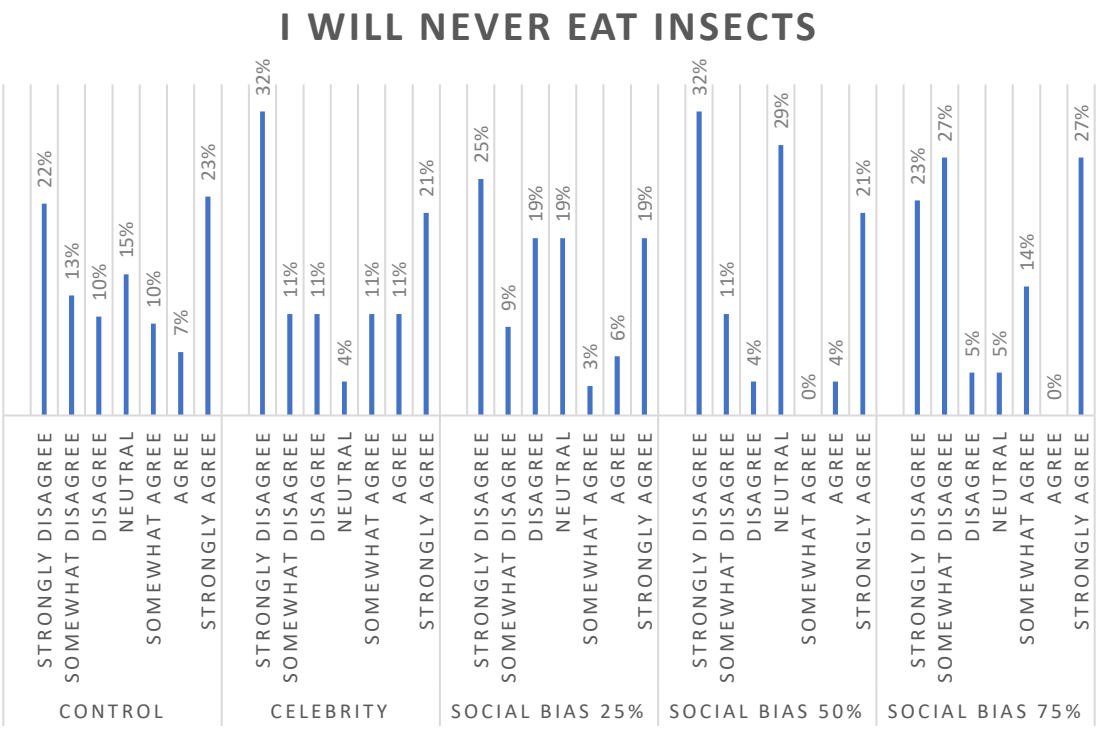
Graph 14. Comparison responses for the statement "I would eat insects in the future".



Graph 15. Comparison responses for the statement "I like insects and would eat them now and then".



Graph 16. Comparison responses for the statement "I don't like the taste, smell or texture of insects".



Graph 17. Comparison responses for the statement "I will never eat insects".

CONTROL

	Strongly disagree	Somewhat Disagree	Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I would eat insects every opportunity I have	46%	22%	7%	13%	9%	0%	1%
I would eat insects if available but not go out of my way	32%	9%	13%	9%	18%	16%	4%
I would eat insects only if there were no other food choices	13%	15%	10%	23%	21%	13%	5%
I would eat insects in the future	25%	5%	10%	18%	18%	14%	10%
I like insects and would eat them now and then	43%	16%	9%	22%	5%	5%	0%
	Strongly disagree	**Somewhat Disagree**	**Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly Agree**
I don't like the taste, smell or texture of insects	5%	7%	3%	40%	10%	11%	24%
I do not like the appearance of insects	2%	2%	3%	4%	14%	28%	46%
I will never eat insects	22%	13%	10%	15%	10%	7%	23%

Table 13. Control group responses.

SOCIAL BIAS 25%

	Strongly disagree	Somewhat Disagree	Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I would eat insects every opportunity I have	31%	25%	28%	9%	6%	0%	0%
I would eat insects if available but not go out of my way	25%	16%	16%	6%	25%	9%	3%
I would eat insects only if there were no other food choices	9%	16%	16%	28%	19%	6%	6%
I would eat insects in the future	22%	3%	9%	13%	25%	16%	13%
I like insects and would eat them now and then	44%	13%	6%	31%	3%	3%	0%
	Strongly disagree	**Somewhat Disagree**	**Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly Agree**
I don't like the taste, smell or texture of insects	3%	9%	13%	31%	19%	6%	19%
I do not like the appearance of insects	6%	3%	3%	3%	25%	13%	47%
I will never eat insects	25%	9%	19%	19%	3%	6%	19%

Table 14. Social Bias 25% group responses.

SOCIAL BIAS 50%

	Strongly disagree	Somewhat Disagree	Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I would eat insects every opportunity I have	50%	11%	21%	4%	7%	4%	4%
I would eat insects if available but not go out of my way	32%	4%	11%	14%	25%	11%	4%
I would eat insects only if there were no other food choices	18%	18%	11%	18%	29%	4%	4%
I would eat insects in the future	32%	4%	7%	14%	21%	7%	14%
I like insects and would eat them now and then	39%	14%	4%	29%	7%	7%	0%
	Strongly disagree	**Somewhat Disagree**	**Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly Agree**
I don't like the taste, smell or texture of insects	11%	14%	7%	21%	4%	18%	25%
I do not like the appearance of insects	7%	0%	7%	7%	4%	25%	50%
I will never eat insects	32%	11%	4%	29%	0%	4%	21%

Table 15. Social Bias 50% group responses.

SOCIAL BIAS 75%

	Strongly disagree	Somewhat Disagree	Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I would eat insects every opportunity I have	27%	27%	9%	27%	5%	0%	5%
I would eat insects if available but not go out of my way	18%	9%	14%	5%	18%	32%	5%
I would eat insects only if there were no other food choices	14%	5%	14%	18%	9%	18%	23%
I would eat insects in the future	14%	18%	5%	23%	14%	23%	5%
I like insects and would eat them now and then	32%	27%	9%	23%	5%	0%	5%
	Strongly disagree	**Somewhat Disagree**	**Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly Agree**
I don't like the taste, smell or texture of insects	5%	9%	5%	59%	0%	9%	14%
I do not like the appearance of insects	9%	0%	0%	0%	23%	27%	41%
I will never eat insects	23%	27%	5%	5%	14%	0%	27%

Table 16. Social Bias 75% group responses.

CELEBRITY BIAS

	Strongly disagree	Somewhat Disagree	Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I would eat insects every opportunity I have	36%	25%	18%	11%	4%	4%	4%
I would eat insects if available but not go out of my way	21%	14%	11%	18%	18%	11%	7%
I would eat insects only if there were no other food choices	18%	4%	36%	7%	18%	7%	11%
I would eat insects in the future	29%	0%	11%	11%	18%	25%	7%
I like insects and would eat them now and then	32%	11%	18%	29%	4%	7%	0%
	Strongly disagree	**Somewhat Disagree**	**Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly Agree**
I don't like the taste, smell or texture of insects	7%	0%	18%	43%	7%	11%	14%
I do not like the appearance of insects	0%	0%	11%	7%	11%	25%	46%
I will never eat insects	32%	11%	11%	4%	11%	11%	21%

Table 17. Celebrity Bias group responses.

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