Perception and Acceptability of Insect-based Snacks of University Students in China

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Yizhi Yao

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Supervised by:

Dr.ir. LPA (Bea) Steenbekkers

Dr Ir. Ruth T. Ngadze

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Preface

Before embarking on my educational journey in the Netherlands, insect-based food was a relatively unfamiliar concept to me. It wasn't until I studied Food Law that I encountered insect-based food for the first time, and I am fascinated by how edible insects are listed as a novel food and scripted in the EU regulation.

My curiosity about edible insects persisted beyond the end of my Food Law course. Thanks to the campus career services, I had the opportunity to attend a captivating guest talk by a Singaporean edible-insect food company. This experience expanded my understanding of insect-based food, and at that point I am able to see the potential of this tiny insect protein in shaping the future of our food industry.

Upon returning to my home in Shanghai during the summer vacation, I was surprised that I could not find a single insect-based food product on the market. Trigger by my interest in the absence of this novel food and its consumer acceptance, I decided to explore this area further in my Master's thesis research.

Bea and Ruth have offered me invaluable support and suggestions during my thesis writing. They have helped me a lot on developing a successful interview guide and extracting valuable insights from the result. Additionally, I really appreciate their flexibility in accommodating online meetings as I am conducting my research overseas. I also want to thank my parents for all their supports, especially by driving me to Fujian and Zhejiang in order to help me face-to-face interviews with local residents to enrich the breath of my study.

With all the support I have received, I hope this research could offer valuable insights for food companies when establishing design parameters for insect-based food and promoting such products in China.

Yizhi Yao
Shanghai, China
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Abstract

The consumption of insects, particularly in the form of innovative snacks, has been shown to offer economic, environmental, and nutritional benefits. Despite historical and cultural significance, many regions including China have transitioned their dietary pattern to conventional meats due to modernization. This study explores attributes and factors relevant to the sensory perception of insect-based snacks among Chinese university students. Moreover, it investigated the intrinsic, expected, and extrinsic product attributes that influence their preferences. Drawing from relevant literature and 12 qualitative interviews, the study reveals that contextual influences, sensory experiences, motives, demographic factors, education and knowledge, and fear play critical roles in shaping sensory perception. Positive intrinsic quality cues (preferred texture, visual, and smell), expected quality cues (ideal health, taste, and safety), and extrinsic quality cues (advertisement, strategic marketing, and packaging) collectively contribute to a favorable perception of insect-based snacks among Chinese university students. Considering the growing buying power of young Chinese consumers in the market, our findings serve as valuable guidelines for developing insect-based snacks that fit their wishes and needs.

Key words: Insect-based snacks, consumer acceptance, Chinese consumer, novel food, food design

Chapter 1: Introduction to the research

1.1 The historical significance of insect consumption

Insects have long been a valuable food source and have been consumed by over 2 billion people globally since ancient times (Su et al., 2023; van Huis, 2013). In ancient Rome, insects were considered not only as a convenient source to overcome food insecurity but also as a luxurious delicacy (Olivadese & Dindo, 2023). In the lush Amazon rainforest of South America, indigenous communities have been fed on the larvae of *Rhynchophorus palmarum palm weevil* for centuries (Cartay et al., 2020). In China, insect consumption has been integral to culinary traditions for over 2,000 years (Su et al., 2023), with historical figures like Lu You of the Song Dynasty and Kuang Lu of the Ming Dynasty first introducing and promoting ants as food in Guangxi during their respective eras (Zhi-Yi, 1997). Commonly eaten insects include *wasps, ants, cicadas, dragonflies, bamboo caterpillars, and silkworm pupae*. They are often fried, roasted, or stewed (Feng et al., 2012).

1.2 The commercial potential of insects as an alternative protein

Nowadays, driven by regulatory approval and commercialization (Feng et al., 2012), global interest in edible insects is rising simultaneously. In Europe, *mealworms* were approved as food by the EFSA, enabling novel insect-based food products (Boukid et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023). In China, regulations such as the *Technical Specifications for the Production of Drone Pupae* and government promotion of edible *silkworm pupae* signal growing government support (Liu et al., 2019; Su et al., 2023). Valued at $33 million in 2015, the global insect food market is forecasted to grow over 15-fold to $522 million by 2023 (Liu et al., 2019).

In China, a 2018 statistical analysis suggested 5 percent of its population are insect-eaters (Wunsch, 2020). Among them, people aged 41 or older are more willing to eat insects than younger generations (Tzompa-Sosa, Moruzzo, et al., 2023). This finding aligns with Feng et al., who found insect consumption customs are maintained mainly among older people, particularly in ethnic regions like Yunnan and Guizhou. Minority groups such as Dai, Hani, Yi, and Gelao eat *wasps, ants, cicadas, dragonflies, bamboo caterpillars,* and other insects in traditional dishes and annual festivals (Feng et al., 2012).

1.3 Edible Insect: An Economically, Environmentally, and Nutritionally Viable Protein Alternative

Edible insects are excellent protein alternatives that offer economic, environmental, and nutritional advantages (Borrello et al., 2016; Celi & Rudkin, 2016; La Barbera et al., 2018; Tzompa-Sosa, Moruzzo, et al., 2023). First, edible insects offer economic benefits by efficiently converting organic waste into high-quality protein (Cavallo & Materia, 2018; van Huis & Vantomme, 2014). Rearing insects also require fewer technological inputs and capital than livestock (Liu et al., 2019). Compared to livestock, insects require fewer resources, emit fewer greenhouse gases and ammonia, and leave lower environmental impacts (Baiano, 2020; Gravel & Doyen, 2020). *Mealworms,* a commonly consumed insect, have been identified as

more sustainable than conventional proteins such as milk, chicken, pork, and beef (Tzompa-Sosa, Moruzzo, et al., 2023). In addition to their environmental benefits, insects offer a nutritional advantage by providing rich protein, fats, and micronutrients that can improve human health and food security (Churchward-Venne et al., 2017; Rumpold & Schlüter, 2013). Fresh edible insects typically contain 10-25% of protein, which is more than high-protein sources such as soy, meat, and eggs (Bednarova et al., 2014; Bukkens, 2010; Kim et al., 2019; Melo et al., 2023). The fat content in edible insects consists more of unsaturated fatty acids than saturated fatty acids, which is considered healthier for the cardiovascular system (de Castro et al., 2018). Commonly consumed insects such as *crickets* and *mealworms* are also rich in micronutrients (Tzompa-Sosa, Moruzzo, et al., 2023). According to Bukkens (2010), most edible insects contain comparable amounts of iron to beef, which is one of the richest food sources of iron. In sum, edible insects are sustainable and nutritious protein alternatives that can be economically produced.

1.4 Global Population Growth and the Quest for Alternative Protein Sources

In November 2022, the global population reached 8.0 billion, marking a substantial increase from 2.5 billion in 1950. Projections indicate the world's population will be exceeding 9 billion by 2050, representing a nearly 2 billion rise in three decades (United Nations, 2022). This surge in global population growth will drive a continuous increase in protein demand (Cavallo & Materia, 2018), which is expected to double by 2050 (Heim & Krebs, 2018; Smetana et al., 2021).

Meeting this demand will be difficult sustainably. In China, limited arable land and resources constrain traditional agricultural practices from adequately nourishing 1.4 billion people (Liu et al., 2019). Accelerated urbanization exacerbates the scarcity by encroaching upon arable farmland (Liu et al., 2019) As such, China’s conventional meat production will struggle to meet protein demand sustainably, highlighting substantial supply challenges (van Huis & Vantomme, 2014). With China grappling to feed its population, Europe is importing 80% of its protein needs (van Huis, 2013) and avidly searching for alternative protein sources. These food security, environmental sustainability, and production scaling issues prompt the need for alternative, innovative protein sources, such as novel insect-based food (Hémar-Nicolas et al., 2022; Su et al., 2023).

1.5 Changing Perception and Consumption of Insects in Modernized China

While insects leave deep historical and cultural roots in parts of Asia, Africa, and South America (Barennes et al., 2015; Hamerman, 2016), they are often perceived as unfamiliar and unacceptable in many areas today. Insects face considerable stigma in Western cultures as disgusting, dangerous pests posing safety risks (Looy et al., 2014; Mishyna et al., 2020). In China, modernization brought not only economic growth but also a significant shift in dietary habits, particularly the reduced consumption of traditional foods (Chen et al., 2009). Notably, China’s economic growth is demonstrated by an 8% growth in Gross Domestic Product (GDP) and a significant drop in poverty rates from 80% in 1978 to 12% in 1998 have driven substantial changes in the eating preferences of the younger generation (Xue, 2004). Many

previously impoverished families have abandoned traditional foods and adopted the eating habits of the wealthier class (Du et al., 2004). Consequently, traditional cuisines like vegetables, wheat, and fruits are gradually disappearing from dinner tables, making room for conventional animal-based dishes and processed foods (Du et al., 2004). As such, traditional foods including insect-based foods are no longer part of the mainstream diets of Chinese youth (Zhi-Yi, 1997).

1.6 Research Gap Regarding the Edible Insect Market Among Young Consumers in China

Although considerable research has examined developed country consumers, few studies have focused on the edible insect market, consumers, and supply chain in China (Hartmann et al., 2015), particularly among young people who are shifting away from traditional foods and growing to become the buying power of the market (Liu et al., 2019). As a result, researching the attitudes and preferences of insect-based snacks among young consumers, particularly Generation Z and Millennials aged between 18-35 years, will shed light on the future of the edible insect market in China.

Having grown up amid increasing Westernization and digitalization, Generation Z and young Millennials resonate with Western diets (Chaney et al., 2017) and embrace convenience and innovations (Bogueva & Marinova, 2022; Kapusy & Logo, 2017; Kymäläinen et al., 2021; Priporas et al., 2017). For instance, they exhibit a higher prevalence of snacking and consuming more convenience foods compared to older generations (Almoraie et al., 2021; Savige et al., 2007). Their sustainability values were also shaped by coming of age with climate change. Upbringing in smaller families made them individualistic, further departing from their ancestral traditions (Çetin & Halisdemir, 2019). As a result, this research was focused on insect-based snacks, including processed and flavored products for convenient, portable consumption, such as crackers, chips, and snack bars containing insect protein (Alhujaili et al., 2023).

While previous studies have explored the influencers of insect-based food acceptance, a notable gap exists in recognizing the relevant attributes and factors in the sensory perception of insect-based snacks. Moreover, while researchers have examined the motivations and barriers related to insect consumption, few studies targeted non-Western countries. This research gap calls for an exploration of relevant attributes for the sensory perception of insect-based snacks and food quality attributes that shape the acceptance of Generation Z and young Millennials in China (Florença et al., 2022). As a growing buying force shaping the country's food landscape, understanding their perspectives on alternative protein can inform industry positioning and growth (Dimock, 2019).

1.7 Theoretical Focus

Food Sensory Perception

Sensory perception is defined as an understanding of the object or the environment through physical senses (*Sensory Perception*, 2023). It integrates various perception factors such as

multisenses, social beliefs, prior experiences, communication, and environmental context (Martins et al., 2022). These elements set the theoretical basis for this research (Chonpracha et al., 2020; House, 2016). Figure 1 illustrates the basic model of sensory perception.

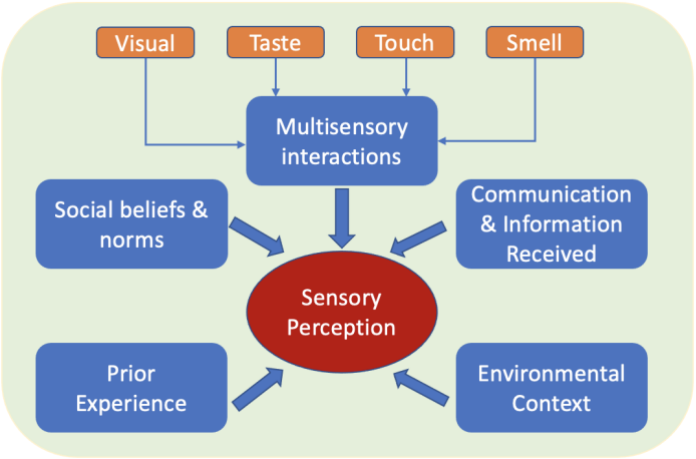

Figure 1.
Basic Model of Sensory Perception (Martins et al., 2022)

Quality Attributes

Quality attributes shaping food sensory perception and its influencers are categorized as intrinsic, expected, and extrinsic attributes (Ardoin, 2021; Chonpracha et al., 2020; Grunert, 2005). Intrinsic attributes are inherent product features such as texture, visual, and smell. Expected quality attributes encompass taste, health, and safety. Expected quality attributes refer to health, taste, and safety. Extrinsic attributes relate to external factors such as attributed quality by marketing/communication and production system characteristics (Luning & Marcelis, 2020).

Grunert (2005) introduced the total food quality model to aid the understanding of consumer perception and food choices before and after purchase. This model emphasized the significance of intrinsic, expected, and extrinsic attributes in driving quality perception and food acceptance (Ardoin, 2021; Feng et al., 2012; Maitiniyazi & Canavari, 2021; Pujols et al., 2019; Röhr et al., 2005; Van Wezemael et al., 2010). Intrinsic cues, including texture, visual, and smell, contribute to sensory perception; extrinsic cues are perceived as extrinsic quality cues; health, taste, and safety form expected quality cues. These cues together subsequently shape their decisions to try or buy. Figure 3 presents the adapted total food quality model from Grunert.

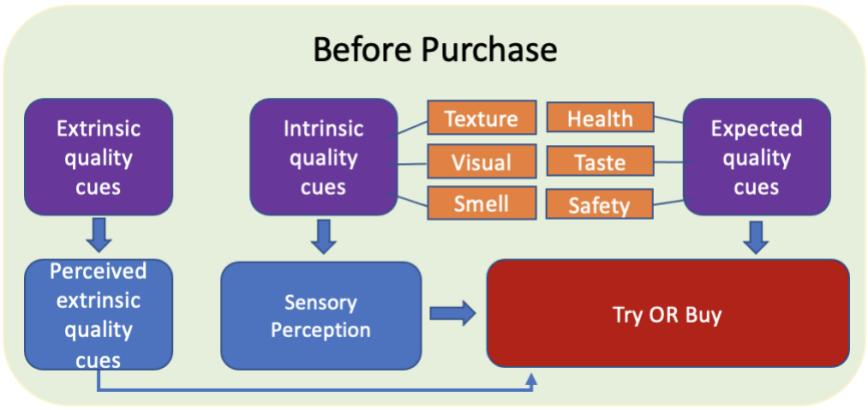

Figure 3.
Total Food Quality Model (adapted from Grunert, 2005).

While previous studies have predominantly quantified consumer acceptance of insect-based food, limited attention has been directed toward qualitatively understanding the attributes shaping consumer perception and acceptance, particularly among young Chinese consumers. Given the need for sustainable protein alternatives, the limited understanding of young Chinese consumers' insect-based snacks sensory perception, and the growing influence of this demographic group, gaining insight into the intrinsic, extrinsic, and expected quality attributes driving their acceptance is crucial. Therefore, this study examined the relevant attributes shaping the sensory perception of insect-based snacks by Chinese Generation Z and Millennial Chinese consumers, the intrinsic quality attributes, the expected quality attributes, and the extrinsic quality attributes of insect-based snacks towards improving consumption of insect-based snack products.

1.8 Research Aim and Questions

This study aims to investigate the relevant attributes in the sensory perception of insect-based snacks among Chinese Generation Z and Millennial Chinese consumers. It further explores the intrinsic, expected, and extrinsic quality attributes influencing their acceptance, to develop guidelines for products that fit their wishes and needs.
To achieve this aim, the following research questions have been formulated:
RQ1: What attributes and factors play a role in the sensory perception of insect-based snacks?
RQ2: What intrinsic quality attributes of insect-based snacks make them appealing to young Chinese consumers?
RQ3: What expected quality attributes of insect-based snacks make them appealing to young Chinese consumers?
RQ4: What extrinsic quality attributes of insect-based snacks make them appealing to young Chinese consumers?

Chapter 2 Research Methodology – Part I theoretical study

2.1 Semi-structured literature review

A semi-structured literature search was conducted to identify factors that influence the perception and acceptance of insect-based snacks, particularly in the Chinese context where such products are currently not available. Given the limited availability of literature on insect-based snacks, the literature review was expanded to a broader examination of insect-based foods.

The review explored the following sub-questions:

Sub-questions:

1. What attributes and factors play a role in the sensory perception of insect-based food?
2. What sensory attributes can increase the acceptance of insect-based food in China?
3. What safety attributes can increase the acceptance of insect-based food in China?
4. What health attributes can increase the acceptance of insect-based food in China?
5. What communication strategies can increase the acceptance of insect-based food in China?
6. What production system attributes can increase the acceptance of insect-based foods in China?

The steps of semi-structured literature analysis of studies were outlined as follows: defining core concepts and synonyms, establishing inclusion and exclusion criteria, formulating search strategies by delineating core concepts, synonyms, and search strings, identifying relevant studies, completing the critical appraisal form, and conducting the analysis of empirical studies.

2.2 Defining core concepts and synonyms

Core concepts and their synonyms used in the semi-structured empirical literature review search are displayed in Table 1.

Table 1.

Core concepts and synonyms relevant to the research problem.

RQ1: What attributes and factors play a role in the sensory perception of insect-based food?	
Core concepts	**Synonyms**
perception	interpretation of sensation, awareness, cognition, apprehension, insight, understanding, comprehension
insect-based foods	entomophagy, edible insects, insect-eating
RQ2: What sensory attributes can increase the acceptance of insect-based food among Chinese consumers?	
sensory	sensory experience, flavor, texture, taste, odor, appearance
RQ3: What safety attributes can increase the acceptance of insect-based food among Chinese consumers?	

safety	hygiene, risks related to illness and diseases, cleanliness
RQ4: What health attributes can increase the acceptance of insect-based food among Chinese consumers?	
health	nutritional value, nutritional quality, high nutrient content, high biological value of nutrients
RQ5: What communication strategies can increase the acceptance of insect-based food among Chinese consumers?	
attributed quality/ communication	advertisement, commercial, marketing, branding, information, packaging, labeling, naming, description, product image
RQ6: What production system attributes can increase the acceptance of insect-based food among Chinese consumers?	
production system	manufacturing system, production process, operation system,

2.3 Inclusion and exclusion criteria

A systematic search identified relevant studies on pre-established sub-research questions through Web of Science and Scopus databases.

Inclusion criteria:

- Studies published 2000-present
- English and Chinese publications
- Empirical research and review articles
- Research on general Chinese consumers and young adults/university students
- All types of insect-based foods

Exclusion criteria:

- Sources in other languages
- Published pre-2000
- Not focused on Chinese consumers

2.4 Defining search strategies

Search queries combined keywords and synonyms related to insect foods (e.g., “entomophagy”, “edible insects”), perception (e.g. “cognition”), and Chinese consumers (“China”, “Chinese”) using Boolean operators like AND/OR. Table 2 presents an example of the search string. Additional relevant sources were identified through snowball sampling of reference lists.

Table 2.

Example of search strain

RQ1: What attributes and factors play a role in the sensory perception of insect-based food?					
Core concepts	**Synonym**	**Database**	**Search Strategy**	**Hits**	**Relevant**
Perception	Interpretation of sensation, awareness, cognition, apprehension, insight, understanding, comprehension	Scopus	("insect-based food" OR "edible insects" OR entomophagy) AND (perception OR attitude)	3	14 (Snowballing)

			AND (China OR Chinese)		

2.5 Selecting articles

Abstracts and conclusions of search results were screened for relevance based on the inclusion/exclusion criteria. Full texts of included articles underwent thorough critical appraisal using a standardized form capturing data on study objectives, methods, findings, and relevance to the research questions.

2.6 Analysis of literature

Critical appraisal data were compiled into summary tables organizing findings by relevance to perceptions and quality attributes. Tables were analyzed to communicate insights on Chinese consumer perspectives toward insect foods and influential intrinsic, expected, and extrinsic factors. They contextualized and integrated with the study's qualitative research to answer the research questions.

Chapter 3 Results and discussion – Part I Theoretical Study

3.1 Relevant attributes and factors for the sensory perception of insect-based food

Contextual Influences

Sensory perception differs in diverse geographic contexts (Tzompa-Sosa, Moruzzo, et al., 2023). Regions such as Anhui, Guangxi, Hainan, Hebei, Henan, Heilongjiang, Jilin, Liaoning, and Shaanxi exhibit a more positive perception of insect-based food, primarily due to their cultural familiarity, adherence to traditional dietary patterns, and a more positive sensory perception towards insect-based food (Lin et al., 2023). Yet, despite the historical relevance of insect consumption in these areas, this practice is often characterized by ambivalence and unfamiliarity in other regions of China (Hartmann et al., 2015; Sogari et al., 2023). Many people in regions that do not have traditional entomophagy show neophobia and reluctance and have a negative sensory perception when surveyed about insects as food (Castro & Chambers, 2019; Sogari et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023; Tzompa-Sosa, Sogari, et al., 2023).

Sensory experiences

In addition to contextual significance, physical sensory experiences significantly contribute to the formation of sensory perception. Studies have suggested that most Chinese consumers perceive the appearance, taste, and touch of insects as unappealing, unsafe, and disease-carrying due to their animal-like qualities and unappealing sensory qualities such as mushiness (Y. Martins & Pliner, 2006; Tan et al., 2017). These negative sensory experiences are key barriers leading to negative perception, including fear, disgust, and product rejection (Martins & Pliner, 2006)

Motives and information Received

Moreover, motives were found to be critical in shaping sensory perception, and different motivations can result in varying perceptions (Tan et al., 2017). For example, if a health-driven consumer is introduced to unfamiliar foods, his motivation for trying is to determine whether the perceived product characteristics meet his health expectations (Tan et al., 2017). If the perceived information is aligned with his motivations, the consumer is then inclined to try under his curiosity and positive perception of the product. On the other hand, an unmotivated consumer may find the perceived product information to be meaningless and therefore do not evoke curiosity and a willingness to try. The lack of motivation consequently leads to reluctance (Tan et al., 2017). As a result, consumers accept a product not only because of how well it performs but also from how well the product aligns with their motivations and expectations.

Demographic factors

China is more open to eating edible insects than many Western countries such as Germany, Italy, the United States, Canada, Australia, and New Zealand (Balzan et al., 2016; Finke et al., 2015; Liu et al., 2020; Hartmann et al., 2015; Shelomi, 2015). This could be due to

China's rich traditions of entomophagy, especially among rural and older populations (Hartmann et al., 2015; Sogari et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023). Demographic factors can also influence consumers' acceptance of insect-based foods (Liu et al., 2019; Tzompa-Sosa, Moruzzo, et al., 2023). Older Chinese consumers and those with higher incomes are more inclined to purchase insect-based foods. This could be because the older generation is familiar with the tradition of eating insects (Liu et al., 2019; Tzompa-Sosa, Moruzzo, et al., 2023), and wealthier consumers enjoy trying out innovative dishes often found in high-end restaurants (Liu et al., 2019). When it comes to gender differences in China, males are more willing to experiment with such foods than females (Tzompa-Sosa, Moruzzo, et al., 2023).

Education and Knowledge

Chinese consumers who are more educated tend to be more open to trying insect-based food, possibly because they have a better understanding of biology and nutrition (Liu et al., 2019; Tzompa-Sosa, Moruzzo, et al., 2023). Understanding biology may make consumers see edible insects as normal and acceptable food sources, and knowledge about the nutritional benefits can create a positive perception of insect-based foods.

Fear

Lastly, fears and concerns about insects hold back the consumption of edible insects in China. These fears might be due to cultural beliefs and the idea that insects are hazardous food sources (Hartmann et al., 2015; Lin et al., 2023; Sogari et al., 2023). Overcoming these fears involves proper preparation methods and education to reduce emotional barriers and make consumers more open to these foods (Liu et al., 2020). However, for consumers with high levels of fear, the influence is limited (Su et al., 2023).

3.2 Intrinsic attributes

Visibility

Consumers often reject such food out of fear and disgust triggered by seeing insects (Liu et al., 2019; Amoah et al., 2023; Florença et al., 2022; Su et al., 2023; Tan et al., 2017; Tzompa-Sosa, Moruzzo, et al., 2023; Tzompa-Sosa, Sogari, et al., 2023; Wang et al., 2015). Whole insects are commonly rejected, but processed insects are better received. Techniques such as smashing or grounding that hide the legs, wings, and antennas of insects cause less disgust and refusals (Amoah et al., 2023; Su et al., 2023). This finding is confirmed in a study where bread made with insect powders is significantly more accepted than whole insects, even when all other features stay the same (Su et al., 2023). This insight calls for eliminating the visibility of insects to improve acceptance. Therefore, it insight suggests that improving acceptance involves eliminating the visibility of insects.

Texture

Texture is crucial for accepting insect-based food. Varying insect species can have different textures, with some being crispy and others soft (Martins & Pliner, 2006). Chinese consumers often find soft, mushy, or squishy textures in insect-based food disgusting, and they prefer a

crispy texture (Martins & Pliner, 2006; Mishyna et al., 2020). Designing a product with a favorable texture such as crispiness and addressing challenges related to chitin and composition can enhance product acceptance (Amoah et al., 2023).

Smell

Limited research examines how smell influences insect-based food acceptance in China, but malodors from insects can elicit disgust and greatly hinder the acceptance of insect-based foods (Florença et al., 2022). Strategies such as cooking, adding masking ingredients, and introducing familiar aromas can help minimize undesirable odors and enhance acceptance (Florença et al., 2022).

3.3 Expected attributes

Taste

As Chinese culture values flavors and changeability, taste strongly motivates consumers' food choices (Nam et al., 2010; Florença et al., 2022; Wang et al., 2015). However, when it comes to innovative foods such as insect-based foods, taste does not seem to be the primary driver for acceptance. A study found that good taste alone might not be enough to convince consumers to wonder if it is safe to eat (Tzompa-Sosa, Sogari, et al., 2023). However, making insect-based food with familiar flavors and ingredients can make consumers more willing to experiment with it (Mishyna et al., 2020; Nadathur & Carolan, 2017). Adapting a product to the culture in the Chinese market, as recommended by Tzompa-Sosa and Sogari et al. (2023), can make insect-based foods more acceptable. This includes following local ways of preparing food such as stir-frying and noodle-based dishes (Tzompa-Sosa, Sogari, et al., 2023).

Safety

Food safety is a foremost concern for Chinese consumers when choosing what to eat (Liu et al., 2019; Tzompa-Sosa, Moruzzo, et al., 2023; Wang et al., 2015). This concern got more heated after after melamine scandals in infant formula, which weakened public trust in locally-produced foods (El Benni et al., 2019). This concern extends beyond dairy to edible insects. For example, many consumers see insects as foodborne and contagious diseases (Tzompa-Sosa, Sogari, et al., 2023). Additionally, allergies and toxicity further aggravated the safety concerns of insect-based foods (Castro & Chambers, 2019). Ensuring food safety is thus a top priority for Chinese consumers to accept such food.

To assure local consumers about the safety of insect-based food, literature suggested safety information such as certifications, production details, and expiration dates (Mirosa et al., 2020; Liu et al., 2014). In China, government safety certifications are particularly trusted because consumers see them as authoritative and reliable (Mirosa et al., 2020). Collaborating with well-known food brands is also effective, as consumers generally trust these established companies (Mirosa et al., 2020). Overall, it is necessary to take proactive steps to make Chinese consumers feel confident about the safety of insect-based food. (Mirosa et al., 2020; Wang et al., 2015).

Health

Health is a frequently mentioned factor that prompts consumers to try insect-based food (Chen et al., 2009; Hartmann et al., 2015; Tan et al., 2017). Studies showed that when afraid of insects, over a third of Chinese consumers are still willing to eat them to reap the health benefits (Qi et al., 2021; Su et al., 2023; Tzompa-Sosa, Sogari, et al., 2023). This is particularly common among older Chinese consumers who care about health and longevity (Su et al., 2023). As a result, products should be made with ingredients that allow for nutritional and health claims. Examples of this include creating snacks with *mealworms* that are rich in protein and healthy Omega-3s similar to the level of fish (Musundire et al., 2016; Su et al., 2023), which may make possible the use of high-protein claims.

3.4 Extrinsic attributes

3.4.1 Extrinsic attributes--Attributed qualities/communication

Strategic marketing and communication are shown to be effective in making insect-based food more acceptable for young Chinese consumers. Researchers suggest that young consumers pay much attention to packaging communication when shopping for food (Castro & Chambers, 2019; Phonthanukitithaworn et al., 2023). Packaging therefore acts as a great starting place to market the product to the consumers. To make the product more appealing, it is recommended to minimize or abstract insect depiction on the package, as this helps to reduce feelings of disgust(Liu et al., 2019; Pozharliev et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023). Furthermore, packaging that emphasizes uniqueness, novel flavors, and sustainability aligns with the values of young consumers who appreciate creativity and novelty (Phonthanukitithaworn et al., 2023). Some studies also mentioned anthropomorphic marketing, which is adding human characteristics to the insect to increase familiarity and acceptance (Pozharliev et al., 2023).

On the other hand, while one study found well-known brands can communicate safety and trust to their consumers (Mirosa et al., 2020), others indicated that Chinese consumers showed ambivalence for brand impact, and they showed little correlation between willingness to eat insects and brand perception (Castro & Chambers, 2019; Phonthanukitithaworn et al., 2023). Nevertheless, producing insect products seems to have a negative influence on brands, and a study showed that 41% of surveyed Chinese consumers indicated they would stop buying other products from companies selling insect-based foods (Castro & Chambers, 2019).

Finally, communicating health-related information also appeals to health-conscious consumers (Chen et al., 2009). Studies have shown that over a third of Chinese consumers are willing to consume insects because of their high nutrition and health benefits, even when they are in fear of insects (Qi et al., 2021; Su et al., 2023; Tzompa-Sosa, Sogari, et al., 2023). However, while strategic marketing of health-related claims proves successful for less neophobic consumers, its impact is limited among neophobic consumers due to their

unfamiliarity and fear (Phonthanukitithaworn et al., 2023). Despite its potential limitation for certain consumer sectors, health messaging still holds promise for increasing acceptance and adoption of such snacks in China. In summary, reducing visibility in packaging, emphasizing benefits and novelty, and certifying safety and quality appear to be effective in driving insect food acceptance in China.

3.4.2 Extrinsic attributes--Production characteristics

With regard to production characteristics, obtaining official safety and quality certifications such as green labels builds important consumer trust (Qi et al., 2021). Yet, the influence of information related to the environmental benefits of insect-based food seems to vary. While studies such as Phonthanukitithaworn et al. (2023) showed a positive influence on acceptance, Tan et al. (2017) and Tzompa-Sosa, Moruzzo, et al. (2023) suggest limited effects. The inconsistency may be attributed to different ways of conveying information and diverse consumer characteristics. Despite potential differences in opinions among consumers, it is essential not to overlook environmentally conscious consumers. Incorporating preferred production characteristics through organic, sustainability, and authenticity certifications appears to motivate their acceptance (Qi et al., 2021).

3.4.3 Factors influencing the consumption of snacks

Snacking grows significantly in China since 2004, and the consumption of fast food, grain-based, and animal-based snacks substantially increased since 1991 for both children and adults (Wang et al., 2012). Despite growing popularity, studies focusing on snack preferences among young Chinese adults were limited. Hence, a study investigating consumption preference for Western-style convenience foods in China may shed light on the pattern of snack preferences among Chinese youth. Curtis et al. (2007) found demographic characteristics to be significant in shaping food preferences. For example, females, younger adults, and families with children exhibited a higher preference for Western-style convenience foods (Curtis et al., 2007). Moreover, Wang et al. (2012) suggested that geographic residence may predict snacking preference. People living in rural areas tend to be more in favor of plant-based foods, possibly because they were raised in plant-centric diets. The level of nutritional understanding also plays a role in shaping snacking preference, and more nutritional knowledge helps consumers develop awareness of healthy eating and make wise decisions in avoiding unhealthy ingredients like added sugars (Wang et al., 2012). Therefore, food companies need to take into account the demographic factors of the targeted consumers when designing their products and tailor the product design accordingly.

3.5 Summary of Findings

The perception among Chinese consumers is influenced by cultural significance, sensory experiences, motives, demographic factors, and fear. Depending on these factors, consumers may form varying sensory perceptions towards insect-based food (Tzompa-Sosa, Moruzzo, et al., 2023), which in turn affects their acceptance or rejection (Su et al., 2023).

Although China may be known for its entomophagy traditions, recent studies suggest insects are no longer regarded as a part of diets today, especially among urban populations and

younger demographics. Also, a lack of understanding of insects as food and fear of insects have greatly increased (Castro & Chambers, 2019; Hartmann et al., 2015; Lin et al., 2023; Sogari et al., 2023; Liu et al., 2019).

To improve acceptance, food companies should focus on incorporating desirable sensory, safety, and health attributes as well as make effective use of marketing and production strategies. All intrinsic, expected, and extrinsic product attributes play a significant role in increasing acceptance (Florença et al., 2022).

Chinese consumers prioritize sensory attributes, health benefits, and safety certifications when looking for food. In terms of sensory attributes, the visibility of insects remains a challenge, and processed forms such as powders seem to be more accepted in insect-based snacks (Amoah et al., 2023; Su et al., 2023). Familiar flavors and ingredients can increase taste acceptance (Liu et al., 2019; Mishyna et al., 2020; Nam et al., 2010), while soft and mushy textures are often perceived as disgusting (Amoah et al., 2023; Y. Martins & Pliner, 2006; Mishyna et al., 2020). Although limited research has been conducted on smell, it is essential to minimize the undesirable odors of insects (Amoah et al., 2023; Mishyna et al., 2020; Wang et al., 2015). Additionally, addressing food safety and foodborne risk can increase trust and acceptance (Castro & Chambers, 2019; Mirosa et al., 2020; Wang et al., 2015; Liu et al., 2014). Lastly, using ingredients with claimed health benefits could motivate health-conscious consumers to try and accept such foods (Hartmann et al., 2015; Musundire et al., 2016; Su et al., 2023).

Extrinsically, using strategic marketing and communication can make the product more appealing. Examples of these include minimizing insects on the packaging and using health claims (Liu et al., 2019; Castro & Chambers, 2019; Phonthanukitithaworn et al., 2023; Pozharliev et al., 2023). In terms of production characteristics, consumers showed more acceptance for products that communicate transparently about ingredients, origin, and production (Qi et al., 2021; Tzompa-Sosa, Moruzzo, et al., 2023; Tzompa-Sosa, Sogari, et al., 2023). They also tend to trust products more if they are officially certified (Mirosa et al., 2020; Wang et al., 2015)

Potential strategies include improving sensory attributes, highlighting safety and health benefits, marketing, and getting the product certified. These strategies were mentioned to help Chinese consumers overcome disgust, safety concerns, and low levels of fear and aversions associated with insect-based foods and to increase acceptance of this novel protein source.

3.6 Theoretical Research Framework

Based on the review of relevant literature, figure 1 presents the current research framework. This framework depicts the perception process associated with the consumption of edible insects, as well as the intrinsic, expected, and extrinsic product attributes that may influence acceptance.

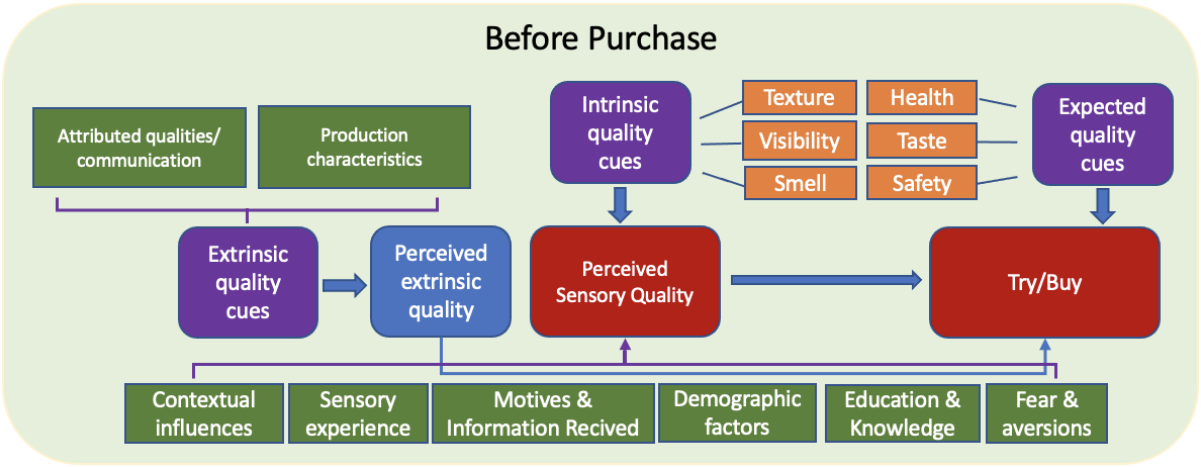

Figure 4.

Proposed Research Framework

The proposed research framework depicts how different factors contribute to sensory perception and acceptance. It includes intrinsic (texture, visibility, smell), expected (health, taste, safety), and extrinsic (production characteristics, communication) quality cues. These factors influence consumers' decisions to try and buy insect-based snacks. Contextual influences, sensory experiences, motives, demographics, and psychological states further shape sensory perception and consumers' intentions to try and buy the product.

Chapter 4 Research Methodology – Part II Empirical Study

4.1 Semi-structured qualitative interview

A qualitative interview was performed based on the pre-established framework to probe empirical insights into how intrinsic, expected, and extrinsic attributes influence the sensory perception and acceptance of insect-based food.

The empirical study explored the following sub-questions:

Sub-questions:

1. What attributes and factors play a role in the sensory perception of insect-based food?
2. What kind of intrinsic quality attributes encourage interviewee to eat insect-based snacks?
3. What kind of expected quality attributes encourage interviewee to eat insect-based snacks?
4. What kind of extrinsic quality attributes encourage interviewee to eat insect-based snacks?
5. What are the ideal design and proposed strategy for insect-based snacks in China?

The steps of this empirical study were outlined as follows: formulating the interview guide, piloting the interviews, generating the interviews, and conducting the analysis of interview data.

4.2 Population Focus

This research was demarcated to Chinese university students, spanning Generation Z and young Millennials born between 1995-2009. Higher education enrollment has surged since 1990, increasing from 326 per hundred thousand to over 2000 per hundred thousand after (National Bureau of Statistics of China, 2022). Moreover, the National Bureau of Statistics of China (2022) further indicated that more than 50% of Generation Z have enrolled in universities, and this trend continues for young Millennials. Given that university students constitute a significant portion of Generation Z and young Millennials in China, they will be the primary focus of this study.

4.3 Recruitment

To ensure a comprehensive and unbiased study, recruitment was done by distributing surveys through social media to achieve a diverse sample across age, gender, geographic hometowns, and ethnicities. Post-recruitment ads targeted potential interviewees with varied backgrounds across platforms such as WeChat, Weibo, and university groups. Respondents provided basic demographic information for screening.

Inclusion criteria:

- University students in China
- Born between 1995-2009

Exclusion criteria:

- Non-Chinese consumers/students
- Consumers/students that were not born and raised in China
- Vegetarians

4.4 Population Size

The focus of qualitative research is to uncover meanings and interpretations behind behaviors (Hennink et al., 2020), and a sample of 15 students was chosen to enable rich, saturated insights within this study's scope, as data saturation often occurs around 12 participants for a relatively homogenous population (Hennink et al., 2020; Boddy, 2016).

Additionally, data analysis was performed concurrently with the interviews to explore new insights that facilitate discussions with the remaining interviewees. Once no new insights were found, data saturation was considered adequate, and the interview stage was terminated. In case where data saturation has not been reached upon interviewing 15 participants, more interviewees were to be recruited and specified in the results and discussion sections.

4.5 Interview Guide

An interview guide was developed based on established qualitative methods (Hennink et al., 2020). It contained three parts: an introduction to connect with interviewees and explain key concepts, a body exploring relevant factors influencing how interviews perceive insect-based snacks, and a conclusion summing up the interview. Additionally, a photo-elicitation was used at the start to stimulate discussion and obtain richer insights (Hennink et al., 2020). To ensure accuracy, clarity, and consistency of the study, the guide was translated into Chinese, backtranslated to English, and pilot-tested with 2 interviewees. The English version of the interview guide for this research is provided in Appendix A.

4.6 Conducting interviews

Qualitative interviews were conducted in-person or online via Teams based on participant's preferences. Offering both formats was crucial for providing a flexible participation option. Interviews were conducted in Chinese, the mother tongue of the interviewees. Each interview was digitally recorded using a Voice memo and subsequently translated and transcribed into English text for analysis. The translation was conducted using DeepL, an online translation service, and underwent manual verification by the researcher to ensure its accuracy. Not only formal interview remarks but also any insightful comments were captured as data under the consent of participants.

Fifteen Chinese university students were recruited to participate in the interview. Table 6 depicts the demographic characteristics of the participants. Figure 5 presented participants about their geographic origins.

Table 6

Interviewee's demographic characteristics

Interviewee code	Gender	Age	Education Level	Ethnicity	Familiarity with Insect-based food
2	Female	24	Master	Miao	Tried bee pupa, ants before
6	Female	20	Master	Han	No prior experience
3	Female	22	Bachelor	Han	No prior experience
14	Female	23	Master	Han	Tried fish feed insects before
15	Female	23	Master	Han	No prior experience
8	Female	24	Master	Han	No prior experience
13	Female	24	Master	Man	Tried fried insects before
5	Male	21	Bachelor	Han	Tried fried silkworm before
9	Male	23	Bachelor	Han	No prior experience
7	Male	25	Bachelor	Han	Tried silkworm pupae before
4	Male	25	Master	Han	Tried fried locust before
11	Male	25	Master	Han	Tried silkworm pupae before
1	Male	26	Master	Han	Tried fried silkworm before
10	Male	26	Master	Han	Tried fried insects before
12	Male	28	Master	Han	Tried a variety of fried insects before

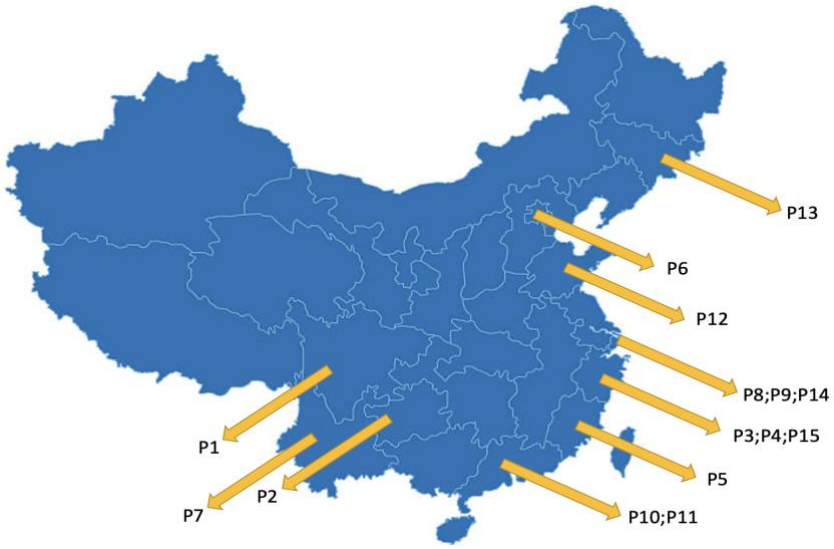

Figure 5.

Map of Participant's Origin

4.7 Data Analysis

Transcripts were imported into ATLAS.ti software for thematic analysis. A coding frame was developed through two cycles for a deeper exploration of the dataset: deductively applying codes derived from literature and theories, and inductively identifying emerging codes from the transcripts. All the data were coded at least twice and two weeks apart to ensure dependability (Hennink et al., 2020). The completed codebook was exported to an Excel spreadsheet where themes, definitions, examples, and interview quotes were organized to communicate findings.

Chapter 5 Results and Discussion – Part II Empirical Study

5.1 Factors influence the perception of insect-based food among Chinese consumers

Contextual Influence

Several participants demonstrated a positive perception of insect-based food under contextual influences. P12 from the northeast mentioned that the local people have been consuming insects since a young age and viewed insect-based foods as just normal food. Yet, P6, 8, 9, 14 from the urban regions who do not consume insects show relatively more negative sensory perception and rejection of insect-based foods. P6 underpinned this view and expressed a fear of insects, finding them "dirty and unhygienic." P6 further rejected snacks made with edible insects, stating, "I wouldn't want to see [insect-based snacks] introduced because I find it disgusting and scary. It feels like I'd be eating bird food." These observations align with Tzompa-Sosa, Moruzzo, et al., who found a close connection between positive perception and culturally influenced regions. On the other hand, P2 who grew up in a region where insects are commonly consumed showed fear and a lower preference for bamboo worms--the type of insect that is consumed commonly in her region. She found bamboo worms "too dry and lack the richness of protein" and expressed a negative perception of insect-based food made with this insect species. Overall, the complex factors shaping the perception of insect-based foods involve not only cultural upbringing and contexts but also personal taste preferences.

Past Experience

Participants often associated novel insect-based snacks with familiar foods. For example, they described insect-based snacks as similar to "grilled lamb skewers, with seasoning similar to that used on barbecue" (P4), "fried crickets" (P5), and "fried silkworm pupae" (P1, 2, 7, 11, 13). Some participants connected them to existing market offerings including pastries and biscuits (P9). Although insect-based snacks have not yet entered the market in China, participants are predisposed to associate the novel perception with previously consumed food products. This highlights the relationship between novel food perception, existing cognitive models, and experiences (Grunert, 2005).

While empirical studies established that prior experiences play a role in shaping people's perception of insect-based snacks, these experiences may not conclusively determine the overall acceptance. P5 is one of many participants who have tried fried crickets in his youth, overcame his fear, and held a positive perception towards insect-based food. He mentioned, "I've eaten them a few times when I was younger, and I'm not afraid of them now." His absence of fear and growing curiosity have promoted his acceptance of future insect-based snacks, stating, "I am looking forward to it because I don't have an aversion to eating insects, and I haven't seen such products in the Chinese market. I'm curious to see what they taste like." In contrast, despite having tried fried silkworm pupa and fried caterpillars before, P13 found consuming insects still "unsettling" and "hard to accept". The differing responses

among participants with similar prior exposure highlight the complexity of perception formation, as past experiences may not consistently predict positive perception.

Sensory experiences

Beyond historical significance, physical sensory play a critical role in shaping sensory perception (Liu et al., 2019; Amoah et al., 2023; Florença et al., 2022; Su et al., 2023; Tan et al., 2017; Tzompa-Sosa, Moruzzo, et al., 2023; Tzompa-Sosa, Sogari, et al., 2023; Wang et al., 2015). Empirical studies echo the theoretical findings and emphasize the importance of initial sensory experiences, particularly visual experiences, in determining perception. When asked about the factors determining their perception of insect-based snacks, the majority mentioned the importance of visual qualities. For example, P2 stated appearance of the food determined her willingness to try and accept it. The shape of insects can aggravate her fear, leading to a negative perception and a refusal to try. Similarly, P3 highlighted the importance the visual quality, stating "If it passes the visual test, I will then assess its taste, brand, and other factors, and if the visual aspect doesn't pass, I will immediately eliminate the product." Hence, visual qualities are significant in determining initial perception, especially among consumers who are afraid of insects. On the other hand, some participants, especially those unafraid of insects, stressed the importance of taste in shaping their views.

Motives and Information Received

Motives and information received were also found to shape sensory perception in both studies. The empirical study supported the literature findings and highlighted that a product meeting consumers' needs and providing positive information tends to be more accepted. To show an example, P7 developed an interest in insect-based food due to its perceived health in protein content. Similarly, P8 initially exhibited aversions and fear towards consuming insect-based food. Yet, P8's perception underwent a positive shift upon receiving positive information, stating "If a friend recommends it, I would be willing to give it a try." This is to say, motives and positive information are influential in shaping the perception of insect-based food, leading to positive perception outcomes and voluntary behavioral changes.

Fear and aversions

Fear and aversions are both mentioned to be significant influencers in shaping the perception and acceptance of insect-based food or snacks. The empirical finding echoed this view and suggested that individuals associating insects with fear, disgust, and aversions are more likely to exhibit low perception and acceptance of insect-based food. perception and acceptance towards insect-based food. For example, P3 rejected insects as a viable food source and mentioned the aversion arise from the subconscious perception of insects as "dark, dirty, and bacteria and viruses carrying [creatures]." Similarly, P6 expressed an inherent fear of insects and described them as "dirty and unhygienic." Their subsequent response mirrored these negative perceptions, where both refused to try cricket-based crackers and cited fear as a significant psychological obstacle. Interestingly, this aversion is not unanimous, as some participants express aversions to specific types of insect groups. P9 associated versions with *silkworm pupae* and purposely avoided this insect group when checking over the ingredients. P14 expressed intolearable aversion towards crickets, stating "I think it's really not okay,

especially those crickets. No, no, no, they are too scary." While consumers differ in their fear and aversions, it becomes evident that these attributes are significant influencers in perception formation.

Education and Knowledge

Empirical findings differed from theoretical findings and indicated that education and knowledge do not consistently lead to higher consumption. For instance, P15 illustrated how education and knowledge positively influenced her perception of insect-based food, as she attributed it to her positive experiences in aquaculture education. In contrast, P9 developed aversion and rejection towards insects from the experience of dissecting *silkworm pupae*. His vivid memory of cutting *silkworms* and observing the innards spilling out left a lasting negative impression, making him reluctant to try any *silkworm pupae* products. Despite both being educated in biology, their perception of insects differs significantly. The variation in reponses suggests that while education plays a role, it is not the only decisive factor in shaping the perception of insect-based foods.

5.2 Intrinsic attributes

Visibility

The empirical study echoed the influence of visibility in influencing participants' perceptions and consumption decisions. For example, P3 considered antennas as "unappealing or scary" and can develop a psychological barrier to products featuring these characteristics. Similarly, P8 associated "scary and unappetizing" insect features with "something out of a horror movie," leading her to reject any exploration of the taste and smell of the product. P10 supported this view and argued that a product's "disgusting or dirty" appearance outweighs any potential good taste. In line with this, P7 noted that consumers generally find visible insect features like legs and antennas off-putting and should therefore be minimized. During elicitation involving participants and three sets of insect-based food products, all participants refused to choose products that showed visible insects, and the absence of insect visibility and features seemed to be decisive in influencing participants' choices. It could be concluded from both studies that the visibility of insects significantly shapes consumer preference, and they highlighted the importance of minimizing the visual characteristics of insects in the design of such snacks.

Texture

Texture is also critical in shaping the acceptance of insect-based food. Many participants expressed that they were more likely to accept food products when the texture matched with food characteristics. For example, P9 emphasized that texture should balance with taste and ingredients for an overall positive experience. P9 believed that the integration of sensory experience matters the most. To illustrate this, P2 provided a concrete example by matching sweet desserts to a "soft, cookie-like" texture, while other participants such as P3 and P4 associated a crispy texture with savory and barbecued-flavored food products. Contrary to the theoretical findings, some participants, including P9, rejected the crunchy taste of insect-based products and associated it with "exoskeleton and legs of insects" and developed a sense

of disgust. Hence, while the theoretical study suggested crunchiness is preferred (Martins & Pliner, 2006; Mishyna et al., 2020), empirical findings showed that aligning with multisensory experiences and avoiding insect sensations are key to increasing textural acceptance for insect-based snacks.

Smell

Limited research has explored the role of smell in insect-based food; however, both studies highlighted that an unappealing smell can result in rejection (Florença et al., 2022). For instance, in the empirical study, P9 expressed hesitation and a sense of disgust when presented with the natural smell of insects, making him question the ingredients. Additionally, P8 characterized the odor of insects as "animal-like, unpleasant, and pungent" and could evoke the imagery of the insect's living environment further contributing to the feeling of disgust. While both studies suggested that unpleasant smells can negatively impact acceptance, the empirical study went further to suggest that the ideal product should be "odorless" (P2) and use seasonings effectively to cover up the "grassy or earthy aroma" associated with insects (P9).

5.3 Expected quality attributes

Taste

In both research studies, it was observed that consumers are more willing to try products with familiar tastes and ingredients (Mishyna et al., 2020; Nadathur & Carolan, 2017). Similar to theoretical studies, interviewees linked flavor attributes to memories and stated pleasant memories can make the overall taste experience more pleasant (Saplakoglu, 2023). For instance, when asked to image future insect-based snacks, P9 connected these foods to spicy, crispy, and seasoned barbecued street foods that he had enjoyed before. He highlighted that he is more open to accepting such foods that remind him of tastes he is familiar with. This preference reflects consumer's inclination to experience novelty without stepping too far outside their comfort zones. Other participants such as P14 associated insect-based snacks with sweetness, drawing parallels to her experience with "Oreo cookies." P8 also envisioned insect-based snacks as "insect biscuits" and expressed a preference for the product to be "sweet and creamy", a taste associated with existing cookie products. While taste preference varied among interviewees, there was an inclination towards preferred foods and familiar tastes. This highlights the role of familiarity and past experiences in shaping new sensory perceptions.

Safety

As demonstrated in both literature findings and interviews, food safety is a foremost concern influencing Chinese consumers' food choices (Liu et al., 2019; Tzompa-Sosa, Moruzzo, et al., 2023; Wang et al., 2015). In the interview with 15 participants, nine mentioned the significance of safety and hygiene. They pointed out a common stigma of seeing insects as food (P7). Worries about safety come from not fully trusting insects as consumable foods (P14), concerns about how they are made (P3), what is made into the product (P7), how it is labeled (P7), and the possibility of getting contaminated (P3).

Both studies agreed that to increase the acceptance of insect-based food, strategies to build trust in insect-based food are necessary (Liu et al., 2014). P7 mentioned clear ingredients and production labels help consumers trust in its safety. P2 emphasized getting national safety certifications is a promising way to show that products meet the safety standards. Moreover, both studies confirmed that food companies need to be proactive in communicating safety through certifications, labeling, and proper listing of ingredients (P1 & Wang et al., 2015). In addition to these insights, P10 offered an interesting perspective by connecting product popularity to safety. He believed that if a lot of consumers are purchasing and consuming the product, then it is generally safe. His unique insight indicates that consumers value safety when choosing insect-based snacks and employ various strategies to ensure a product's quality and safety.

Health

The importance of health attributes appeared less consistent between theoretical and empirical studies. Interviewees had mixed views on the significance of health attributes. 10 of 15 participants consider health attributes to be important in snacks. P7, 8, and 9 actively sought health benefits and functional advantages from insect-based snacks. They expressed interest in these snacks due to their "high protein content." P9 paid extra attention to "fat, calories, and sugar content" when shopping for food. Interestingly, P15 indicated that health claims such as "promoting gut health" could differentiate insect-based snacks and attract consumers. On the other hand, 5 participants offered a contrasting viewpoint and did not prioritize health attributes in their choice of insect-based snacks. They viewed snacks as enjoyment rather than health fulfillment. For example, P1 mentioned "snacks are meant to be enjoyable" and are not expected to be healthy. Additionally, P2 acknowledged that taste and safety take precedence over health, stating that "health aspects alone wouldn't be the main driving force." The difference between the empirical study and the theoretical study could be attributed to the different age focus, as all participants in the interview are relatively young and may exhibit different health pursuits compared to the theoretical studies. Despite variations, a substantial portion of the consumer group considers health as decisive in their purchase decisions, and it is still essential to address their needs and preferences to enhance the acceptance of such products.

5.4 Extrinsic attributes

Advertisement and Strategic Marketing

Many participants highlighted the significance of advertising in shaping their decisions to buy insect-based snacks. P1 and 2 notably underscored the influence of digital advertisement in the present age. They noted that being consistently exposed to product advertisements on social media platforms catches their attention and motivates future purchases (P2). P14 also illustrated the influence of advertisements and reviews by expressing a greater willingness to purchase when exposed to commercial promotions and positive reviews. Additionally, marketing phrases can also grab consumer's attention (P15). P7 mentioned that when all other sensory aspects are met, phrases that show the health and environmental benefits could

motivate her to try. Overall, both studies agreed that advertisements and marketing can make such snacks more acceptable to young Chinese consumers.

Brands

Brand influence varies between the two studies. The empirical study suggested that participants felt safe and satisfied when purchasing from reputable brands. P1 emphasized that a well-known brand increases her likelihood of choice due to "a level of quality and safety." P14 echoes this view by highlighting the advantages of reputable brands in assuring authenticity and safety. She stated, "You don't have to worry about whether it's unreliable, whether it will make you sick, or what kind of reactions it might cause. I think big companies won't do that; they protect their brand, so they won't mess around." P7 also associated trustworthiness with reputable brands in making her "more inclined to try [insect-based snacks]." In other words, interviewees tend to perceive reputable brands positively. Beyond safety signals, the brand's narrative can also shape acceptance. P15 considered brand story as a factor leading to a purchase, stating that an appealing brand story may pique her curiosity to try the product for taste. In summary, the relationship between brand perception and acceptance of insect-based foods is nuanced. While theoretical findings suggest a lack of direct correlation, the empirical evidence found a positive association between brand impact and consumer acceptance.

Packaging

As for packaging, both the theoretical and the empirical studies identified insect images as a key factor hindering acceptance. Interviewees reported disgust and discomfort when seeing insect images on packaging. During the elicitation, when presented with three sets of insect-based food packaging, all participants chose the one without visible insects. For example, P14 found the insect depiction on the packaging as "definitely not okay," and P11 expressed the feeling of disgust and rejection associated with insect depictions. Additionally, P9 pointed out that the display of insects made him believe that the product was "inferior in taste and quality." These consistent findings show that insect depiction is closely tied to negative perception and rejection, and future design efforts should be made to minimize or abstract insect shapes.

Price

Price is not identified as a primary driver for acceptance in the literature, but it is significant in the empirical findings. Several interviewees have highlighted the influence of price on acceptance. For example, P1 expressed hesitation when faced with expensive snacks. Similarly, P4 and P7 also stated that acceptance all comes down to pricing. Higher prices could hinder them from purchase, even if they are satisfied with all other product attributes. Moreover, P5 and P11 mentioned that price alone is not enough to make them purchase, and they also look out for other product attributes such as prices, taste, and health. They believed that there should be a balance in price, palatability, and health. These findings suggest that reasonable pricing should also be considered when designing insect-based snacks.

Production Characteristics

The impact of information related to the environmental benefits of insect-based food appears inconsistent across studies. Interviewees suggested that sustainability and environmental factors do not significantly influence their choice of insect-based snacks. Most participants prioritize sensory factors, safety, health, and packaging over environmental considerations, claiming that they would not compromise these qualities for sustainability. For example, P9 mentioned: “The environment matters to me, but the packaging matters more.” P1 echoed this sentiment by emphasizing that choosing something sustainable does not make sense if it is not enjoyable. While some participants prefer to select products based on personal preferences, others acknowledge the importance of environmental considerations but express reservations about choices. P2 preferred the environmental-friendly option and referred to it as a “bonus” as long as all other qualities are met. However, despite acknowledging the importance of sustainability, empirical studies suggest that the influence of production characteristics related to sustainability seems to be limited.

5.5 Proposed Strategy for promoting insect-based snacks

Interviewees frequently proposed advertising and marketing as means to promote insect-based snacks. They mentioned the importance of unique selling points, creative contexts, and marketing channels. For example, P1 suggested establishing unique selling points such as lower prices, higher nutritional content, and better flavors to differentiate the product from others. In line with this, P2 mentioned the need for marketing to capture consumers’ interest through graphics and interesting headlines.

P15 suggested making use of social media platforms to gain exposure. Since young consumers today spend a considerable amount of time on their phones, social media become one of the main platforms for them to connect and retrieve information. This offers a great channel for food companies to showcase their new products and gain exposure. Nevertheless, these efforts may not overcome the inherent fear of insects rooted in some consumers, as P3 pointed out that these strategies only help to increase acceptance among consumers who are already comfortable with consuming insects.

In addition to marketing, consumers emphasized the expected quality of the snacks. For instance, P2 and P4 highlighted that having good taste is essential to promote the snack among young consumers. Apart from advertising and improving sensory attributes, safety, and appealing packaging were also recognized as significant contributors to acceptance. P7 emphasized the importance of safety and nutritional quality, while P12 highlighted the role of packaging in creating a positive first impression. Beyond enhancing intrinsic, expected, and extrinsic quality attributes, consumer agreed on the need to shift their perceptions and cultivate awareness of these novel foods through education and the spread of information. These strategies complement each other and are integral to enhancing the acceptance of insect-based snacks among young Chinese consumers.

5.6 Discussion

Based on the results and discussion of both theoretical and empirical studies, the proposed research framework shown in Figure 6 is adapted to the present findings.

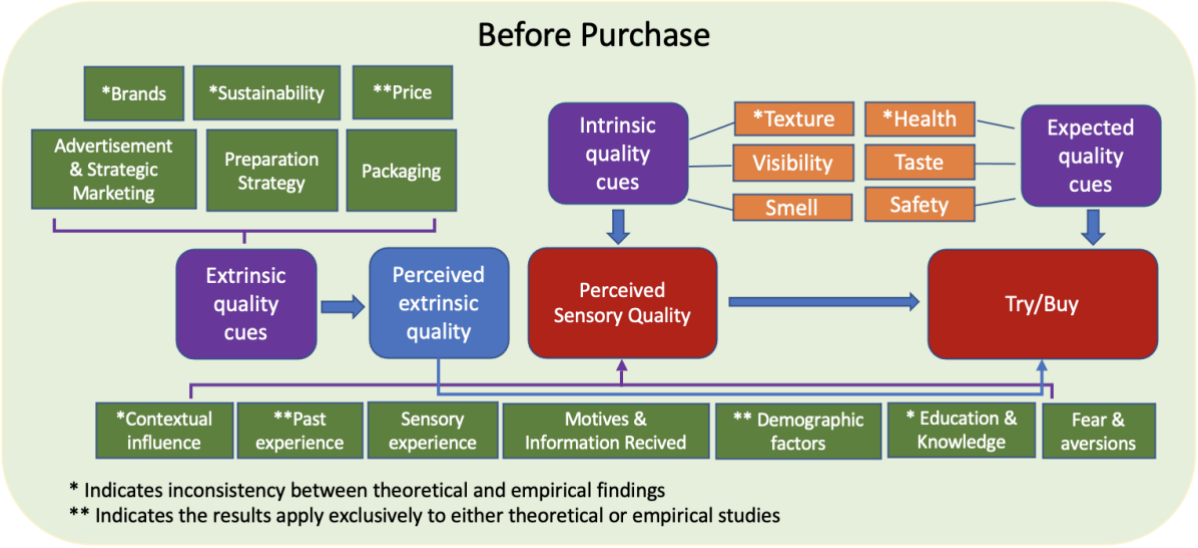

Figure 6.
Adapted Research Framework

As illustrated in the lower green blocks, both studies identified contextual influences, sensory experiences, motives and information received, education and knowledge, and fear and aversions to be relevant in shaping sensory perception of Chinese university students on insect-based snacks (Castro & Chambers, 2019; Sogari et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023; Tzompa-Sosa, Sogari, et al., 2023). While most of these factors are aligned between the two studies, there is a difference in interpreting contextual influences and education. Empirical findings emphasized that personal preferences could influence how contextual influences shape sensory perception. Moreover, interviewees with the same education and knowledge may vary in responses due to the dynamic nature of preferences. This valuable qualitative insight complements the existing quantitative findings and highlights the complexity of human responses.

Demographic factors, such as gender, age, and income were influential only in theoretical studies. These factors were not found significant in interviews due to a relatively homogenous sample of university students. Future research should aim to include a diverse population to address the limitation in demographic variation observed in this study.

Past experiences were only mentioned in the empirical studies, which indicates a gap in the literature. Considering the growing importance of insect-based snacks, future research is recommended to explore consumers' taste preferences and understand the formation and influence of past experiences with insect-based snacks.

Both studies showed that intrinsic, expected, and extrinsic quality cues play a role in shaping decisions. In the upper right orange blocks, texture, visibility, and smell were identified as

intrinsic quality cues, while taste, health, and safety were expected. However, views differed on the preferred texture and the influence of health. Although literature suggested that crispy texture is preferred among Chinese consumers (Martins & Pliner, 2006; Mishyna et al., 2020), some interviewees were reluctant to try crispy textured snacks as they remind them of insect features, and they suggested avoiding any textural associations with insects. Opinions on health were also divided. Literature indicated Chinese consumers value health when choosing edible insects (Chen et al., 2009; Hartmann et al., 2015; Tan et al., 2017), while one-third of interviewees find health less influential in choosing snacks. These discrepancies may stem from personal preferences and subject differences, as literature findings focused on edible insects and insect-based food, and interviews focused on snacks which consumers typically associate with pleasure and enjoyment.

Extrinsic quality cues such as brands and sustainability also differed. While theoretical studies suggested limited brand impact (Castro & Chambers, 2019; Phonthanukitithaworn et al., 2023), the empirical study found reputable brands effective in enhancing acceptance. Similarly, the influence of sustainability was limited in empirical studies. These variations could be attributed to individual preferences and demographic focus, as participants in theoretical research represent a broader demographic than just university students. It may also indicate that Chinese university students might prioritize brands and are less sensitive to sustainability when choosing insect-based snacks.

While the theoretical study did not highlight price, it is a significant factor in the empirical finding. The differences could be attributed to the financial constraints of university students. Given that price is identified as a significant driver in shaping consumer responses, future research should include price as a key quality cue in driving acceptance.

5.7 Limitations

While this study has offered valuable insights into the relevant factors shaping the perception of insect-based snacks among Chinese university students, as well as the quality attributes influencing their acceptance, there are several limitations in the research process.

First, given that insect-based snacks are novel and are not yet available in China, the study centers around understanding consumer's perceptions and proposing design requirements within this emerging food category. Due to a scarcity of literature focusing on insect-based snacks, the theoretical study was focused more broadly on insect-based foods. Similarly, the empirical study drew heavily from interviewee's expectations towards insect-based snacks, as few of them had prior experiences with this novel food. Although efforts were made to align the research scope, the difference in focus may introduce some uncertainty that undermines the research's accuracy.

Second, photos of the insect-based snacks used during the interview were sourced from Western countries due to the absence of these products in the Chinese market. Despite efforts to include a diverse range of food products and familiarize participants with these novel items, the exotic nature of these products and the potential language barrier could still be

unfamiliar to interviewees and introduce unavoidable bias that limits the accuracy and effectiveness of the empirical research.

Third, although efforts were made to include a diverse range of ethnicities in the interviewees, challenges still existed in reaching minority groups. As a result, this study only captured perspectives from three out of the fifty-six ethnicities in China. The underrepresentation of minority voices, especially those from ethnicities with a tradition of entomophagy, may exclude invaluable insights that could enrich the depth and breadth of this study.

5.8 Recommendations

This study was conceptualized based on Grunert's (2005) framework of the total food quality model and targets the before-purchase stage. Considering the exploration of insect-based snacks is a novel field of research, more studies in the before-purchase stage are needed to explore further consumers' desired quality attributes. Obtaining additional insights is essential for developing comprehensive design requirements, which are critical to coming up with successful products that fit consumer wishes.

Chapter 6 Conclusions

6.1 Conclusion of the Qualitative Research

6.1.1 RQ1: What attributes and factors play a role in the sensory perception of insect-based snacks?

Positive sensory experiences, health-related motives, and a lack of fear contribute to positive sensory perceptions. For instance, positive memory about taste, visual, and texture, along with desirable claims such as high protein contents, familiarity with insect-eating cultures, and an absence of fear may motivate the consumer to perceive insect-based products positively (Castro & Chambers, 2019; Sogari et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023; Tzompa-Sosa, Sogari, et al., 2023). On the other hand, influences of contexts, past experiences, demographic factors, education, and knowledge may vary, as inconsistencies were observed between the two studies.

6.1.2 RQ2: What intrinsic quality attributes of insect-based snacks make them appealing to young Chinese consumers?

Intrinsic quality attributes crucial for the appeal of insect-based snacks to young Chinese consumers include texture, visibility, and smell. In terms of texture, literature findings advocated for eliminating soft, slimy, and mushy textures of insects while empirical findings suggested removing any textural qualities associated with insects (Y. Martins & Pliner, 2006; Mishyna et al., 2020). Moreover, both studies stressed the need to reduce insect visibility such as antennas and wings. Lastly, it is important to remove the unpleasant smell found in edible insects (Florença et al., 2022).

6.1.3 RQ3: What expected quality attributes of insect-based snacks make them appealing to young Chinese consumers?

Expected quality attributes refer to taste, health, and safety attributes. Both studies indicated that familiar tastes and ingredients, and traditional cooking styles enhance the appeal of insect-based snacks (Mishyna et al., 2020; Nadathur & Carolan, 2017). The empirical study further highlighted that barbecued, fried, pastry-styled snacks and the use of masking seasoning seemed to be favored among young Chinese consumers. Along with desirable taste, safety, and health attributes are also found to enhance the acceptance of insect-based snacks. Obtaining safety certifications and proper labeling can alleviate consumer concerns about safety and diseases (Mirosa et al., 2020; P1; Wang et al., 2015). As consumers are becoming increasingly health conscious (Su et al., 2023), products should be made with health-promoting ingredients that could make possible the addition of nutritional and functional claims (Chen et al., 2009; Hartmann et al., 2015; Tan et al., 2017).

6.1.4 RQ4: What extrinsic quality attributes of insect-based snacks make them appealing to young Chinese consumers?

Advertisement, strategic marketing, and appealing packaging are critical in enhancing consumer appeal. Food companies can make use of creative content, promotional phrases, and anthropomorphic techniques to enhance acceptance (Castro & Chambers, 2019;

Phonthanukitithaworn et al., 2023; Pozharliev et al., 2023). For example, making edible insects into cartoons can make them more approachable to consumers (P1, 2, 3, 5, 13, 14). As for packaging, it is critical to eliminate images of insects (Liu et al., 2019; Pozharliev et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023)

The influence of production characteristics on increasing acceptance showed inconsistency across studies (Tzompa-Sosa, Sogari, et al., 2023). Empirical research indicated that products from reputable brands can convey safety and trust, thereby enhancing acceptability. Yet, this influence was limited in theoretical studies. Sustainability was effective in theoretical studies when targeting environmentally-conscious consumers, leading to higher appeal, but the influence was insignificant in empirical studies. Lastly, highlighting cost-effectiveness was shown to be effective in empirical studies, making the product more appealing among price-conscious consumers.

6.4 Implications

With the global population on the rise (United Nations, 2022), protein insecurity escalates to be a global crisis, which prompts a quest for alternative protein. Being an economical, environmentally, and nutritional protein alternatives (Borrello et al., 2016; Celi & Rudkin, 2016; La Barbera et al., 2018; Tzompa-Sosa, Moruzzo, et al., 2023), insect-based food has attracted eyes across the global and was marketed as novel snacks in many Western countries (Boukid et al., 2023; Tzompa-Sosa, Moruzzo, et al., 2023). In alleviating the upcoming protein insecurity crisis and promoting the adoption of insect-based food in China, this study examined the perceptions and factors influencing the acceptance of insect-based snacks among young Chinese consumers by recognizing the prevalence of snacking among the youth (Almoraie et al., 2021; Savige et al., 2007) and their roles as future market influencers (Dimock, 2019). The outcome of the study suggested that, despite variations in perceptions, commonalities exist among young consumers in their preferences for intrinsic and extrinsic attributes of food products. These intrinsic and extrinsic attributes were outlined in hopes of serving as valuable design parameters for the future development of this novel food category.

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Appendix

Appendix A: Interview Guide

1. Introduction

(*Start recording*)
I would like to thank you for making time for this interview. My name is Yizhi. This interview is part of my Master's thesis research.
This interview will take around 15 minutes. Before I start, I would like to inform you that you have consented to participate in this interview and that this interview will be recorded. The recording will be used only for this study's data analysis and interview transcription, and your privacy and anonymity will be protected.

Clarifications of terms:
Before I start, I would like to clarify the key terms I will refer to throughout the interview. All the food products mentioned in the interview are insect-based snacks. They are snacks that incorporate edible bugs as key ingredients for human consumption. Examples of these include insect-based crackers, Granola bars, biscuits, and chips.

The aim of this interview:
Now I would like to briefly summarize the aim of this study, which is to gain insight into young Chinese consumers' perceptions of insect-based snacks and the factors shaping their acceptance. This interview will be divided into five sections. All the questions are open-ended and there are no right or wrong answers.

2. Body of the Interview

Now I will move forward to the core part of the interview, and I will start with some general questions.

Part A- General Question:

1. How old are you?
2. What is your educational level?
3. What is your ethnicity?
4. Where did you grow up and where do you live currently?
5. How many people are there in your household?
6. Have you ever tried an insect-based snack before? If so, could you share your experience? If not, what has prevented you from trying them?
7. If you only have tried insect-based food before, could you please share your experiences? And what do you think are the differences between insect-based food and insect-based snacks?

Part B- Questions on the factors that play a role in the perception of consuming insect-based snacks
Next, I would like to ask questions about your perception of consuming insect-based snacks.

1. Let's first discuss the visual experience. When you are imagining insect-based snacks, what image, color, size, etc. comes to your mind? (Probe for visionary experience)
2. Now seeing the pictures of various insect-based snacks that are already sold on the market, what visual experience and thoughts do these images evoke?

3. Now let's talk about the tasting experience. What flavors and textures come to mind when you think about insect-based snacks?
4. What do you think could positively influence your perception of the taste and texture of insect-based snacks?
5. Lastly, let's talk about the olfactory and auditory experience. When you think about eating insect-based snacks, can you describe any thoughts about their aroma and sound?
6. Among the sensory experiences you just mentioned, including vision, taste, smell, and hearing, which physical sense is most important when comes to choosing insect-based snacks?

Part C- Questions on the intrinsic, expected, and extrinsic quality attributes shaping the acceptance of insect-based snacks

Now I would like to know what are some product attributes that may shape your acceptance of consuming insect-based snacks.

1. Apart from sensory attributes, what other factors do you attention to when purchasing insect-based snacks? (For example, health, safety, packaging, brand, advertisement, organic, authenticity, sustainability)
2. How do you think these factors will encourage you to eat or avoid insect-based food?
    a. Why is this factor important to you?
3. This is a cracker made with cricket flour. It's similar in taste and texture to regular crackers. What do you think of them? Would you eat them?
    a. Follow-up question: If you're not sure, please tell me what factors would influence your decision to try it or not.

(Small Giants, 2023)

2. If you are looking for a snack, which product of the three do you prefer? Why? (Probing for the effects of packaging information/visuals)

(*CRICKÉ*, 2023; *Cricket Cookies*, 2023; *Lightly Salted Insect Mixture*, 2023)

   a. Follow-up question: Knowing that the snack you did not choose is more sustainable than the others, does that make you more likely to try that product?

3. Among all the product attributes you just mentioned, including sensory attributes, could you rank their importance to you when purchasing insect-based snacks and explain the order you have chosen?
4. If you could create your insect-based snack. What would it be like? Choose your preferred labels from below and name some ingredients you prefer. (Probe for flavor/label/packaging)
5. There are insect-based foods available in the Chinese food market, such as fried grasshoppers and silkworms, and a lot of young people seem to show acceptance towards it. However, there are no insect-based snacks on the market. Are you looking forward to having such products in the market, why is that?

Part E: Closure

Thank you for your participation.

- Do you have any questions left before the closure?

This is the end of the interview. I am grateful for the time and dedication you devoted to this study, and your insights are invaluable to my project. I will transcribe this interview, and in case you want a copy of the transcript and the final report, please feel free to contact me. My email address is yizhi.yao@wur.nl.

Appendix B: Interview Transcripts

Interviewee 1

Interviewer: Thank you for taking the time to participate in this interview. My name is Yizhi. This interview is part of my graduate thesis and is expected to take about 15 minutes. Before we begin, I want to inform you that you have consented to participate in this interview and have agreed to have the interview recorded. This interview will be used exclusively for research data analysis and interview transcription, and your privacy and anonymity will be protected.

Interviewer: Before we start, I'd like to clarify some terms. In this interview, when we mention "foods," we are referring to edible insect-based snacks, including insect cookies, insect oatmeal bars, insect potato chips, and so on.

Interviewer: The interview will be divided into five sections, and all questions are open-ended, so there are no right or wrong answers. Alright, let's start with some general questions. First, how old are you?

Interviewee 1: I'm 26 years old.

Interviewer: What is your educational level?

Interviewee 1: I'm in the third year of my graduate studies.

Interviewer: Which ethnic group do you belong to?

Interviewee 1: I am Han Chinese.

Interviewer: Where did you grow up?

Interviewee 1: I grew up in Mianyang, Sichuan.

Interviewer: How many people are there in your family?

Interviewee 1: There are three people in my family.

Interviewer: Have you ever tried insect-based snacks? If yes, could you share your experience?

Interviewee 1: I haven't tried the specific insect snacks you mentioned, like insect chips or insect cookies, but I've had fried silkworm pupae. They were very fragrant and crispy.

Interviewer: So, you are generally open to eating insect-based foods.

Interviewee 1: It depends on the type of insect. I'm okay with silkworm pupae, but I wouldn't be comfortable with things like roaches or spiders.

Interviewer: I understand. Now, let's talk about your perceptions of insect-based snacks. When you think about them, what do you imagine in terms of their appearance? Can you describe it?

Interviewee 1: When I think of insect-based snacks, I imagine something like lollipops with colorful and transparent candy on a stick, with insects inside. Or perhaps something like cookies that look similar in color to regular Danish butter cookies but with powdered insects inside.

Interviewer: How do these visual experiences make you feel?

Interviewee 1: For insect cookies, I think they look quite acceptable because you can't see the actual insects, and they don't seem disgusting. However, insect lollipops might be less acceptable to me. The idea of a creepy-crawly centipede inside a lollipop is unsettling, especially once you bite into it.

Interviewer: I see. You mentioned that you've tried fried silkworm pupae before, which you found fragrant and crispy. Given that you could see the appearance of the silkworm pupae, what were your thoughts or feelings about eating them?

Interviewee 1: I was fine with it because I'm not afraid of silkworm pupae. I didn't find them disgusting. I treated them like regular fried meat snacks. However, I wouldn't be comfortable with fried centipedes or other insects that look like pests. They would be too unsettling.

Interviewer: Understood. Now, I'd like to show you pictures of various insect-based snacks available on the market. What are your visual impressions and thoughts about these images?

Interviewee 1: These are presented quite well. You can't tell they're made from insects, and I find them acceptable. The one that looks like corn chips is quite refreshing.

Interviewer: Great, now let's talk about taste. When you think about insect-based snacks, what taste or texture do you imagine?

Interviewee 1: I imagine there could be both savory and sweet options. For cookies, I would expect sweetness with flavors like milk or chocolate. For chips, they could be salty and savory, maybe with a barbecue flavor.

Interviewer: What do these taste descriptions evoke in you in terms of thoughts or feelings?

Interviewee 1: I think it's good. The flavors align with what I'm familiar with. I've had similar flavors before in non-insect snacks.

Interviewer: So, familiarity with flavors is a key factor for you.

Interviewee 1: Yes, familiarity and comfort with the flavors matter.

Interviewer: Alright, let's discuss the sense of smell. When you think about eating insect-based snacks, can you describe the aroma or scent you would associate with them?

Interviewee 1: You mean what they would smell like?

Interviewer: Yes, exactly.

Interviewee 1: The smell would be somewhat similar to the taste. Barbecue-flavored snacks might have a cumin or spicy aroma with a hint of charcoal. It would be something like the scent of barbecued potato chips. For sweet snacks, the aroma would be rich and chocolatey, similar to regular chocolate cookies.

Interviewer: Are these scents something you would accept and enjoy in insect-based snacks?

Interviewee 1: Yes, I find them quite good. The scents are familiar and appealing to me.

Interviewer: Among the sensory experiences we've discussed - visual, taste, and smell - which one is most important to you when choosing insect-based snacks, and why?

Interviewee 1: The most important aspect is the visual appearance. If the appearance is unappealing, I wouldn't want to try it. After that, taste is essential; the snack has to be delicious. Smell is less critical to me as I don't pay too much attention to it when eating snacks.

Interviewer: I see. Now, apart from these aspects, are there other factors you would consider when purchasing insect-based snacks?

Interviewee 1: I would definitely consider the price. If it's too expensive, I might hesitate to buy it.

Interviewer: What about health, safety, packaging, and environmental concerns?

Interviewee 1: I rarely consider health when buying snacks. Snacks are meant to be enjoyable, and I don't expect them to be healthy. For safety, I might check the brand and manufacturer and the remaining shelf life. Packaging doesn't matter much to me. If it tastes good, that's what counts. Environmental concerns are not a major factor for me either.

Interviewer: You mentioned that you pay attention to the brand and the manufacturer's reputation for safety. Can you explain how this impacts your choices?

Interviewee 1: When I buy things, I tend to favor well-known brands. If I see two products side by side and one is from a brand I've been using for a while, and the other is a new brand I've never heard of, I would definitely choose the familiar one.

Interviewer: So, brand size and familiarity play a role in your decision.

Interviewee 1: Yes, they do.

Interviewer: How about the influence of advertising? If you haven't tried a product but have seen frequent advertisements for it, would that affect your decision to try it?

Interviewee 1: If the advertisements are compelling and there's something special about the product that grabs my attention, I might be more likely to pay attention to it when I'm

shopping. If it's on sale or has a promotion, I might give it a try. If it's delicious, I might become a repeat customer.

Interviewer: Great, now I'd like to show you a series of thin crispy cookies made from cricket flour. They taste and have a texture similar to regular cookies. What are your thoughts about them? Would you be willing to try them?

Interviewee 1: I would be willing to try them. They look similar to regular cookies and don't have any off-putting features. Plus, I've never tried something like this, so I'm curious about how they taste.

Interviewer: If you were looking for a snack now, which of the three products would you prefer? Why?

Interviewee 1: I still prefer the third product. The first two seem unappetizing to me, especially the second one, which looks somewhat like a cockroach. The third one looks more like regular cookies, and I find it more acceptable.

Interviewer: So, packaging does influence your purchasing decision.

Interviewee 1: Yes, especially the images on the packaging. I might not pay much attention to the text, but the images matter.

Interviewer: If you knew that the product you didn't choose was more environmentally friendly than the others, would that make you more willing to try the other two?

Interviewee 1: No, it wouldn't. Even if it's more environmentally friendly, if I've tried the other products and found them unappetizing, I probably wouldn't want to eat them again. It wouldn't make sense to buy something I don't enjoy, even if it's environmentally friendly.

Interviewer: That makes sense. Of all the product attributes we discussed, could you please rank them in order of importance to you, from highest to lowest?

Interviewee 1: At the top, I'd place the product's visual appeal, which includes packaging and how the snacks look. Next would be taste, followed by cost-effectiveness, meaning the balance between brand and price. Last would be factors like health and environmental concerns.

Interviewer: Thank you for sharing that. If you had the opportunity to create your own insect-based snacks, what flavor, ingredients, texture, and packaging would you prefer?

Interviewee 1: I'd like a barbecue flavor with a crispy texture and some insect bits mixed in potato chips. The packaging should be simple, without prominent insect imagery. Maybe add some cartoon elements to make it more appealing to children.

Interviewer: Now, there are insect-based foods available in the Chinese market, like fried crickets and silkworm pupae, and many young people are accepting them. However, insect-based snacks, like cookies and chips, are not yet available. Are you looking forward to the introduction of insect-based snacks to the Chinese market, and why?

Interviewee 1: I'm actually looking forward to it because I feel that there's a lack of such products in the Chinese market. I think having a variety of options is good, and I'm personally open to insect-based snacks.

Interviewer: What do you think would be necessary to promote insect-based snacks among young Chinese consumers?

Interviewee 1: I believe that to promote insect-based snacks, they need to be accepted as a food source first and not seen as pests. Then, they should have a unique selling point, such as being exceptionally delicious or having high nutritional value. This would help establish a relatively stable customer base.

Interviewer: That concludes the interview. Thank you for your time and insights. If you'd like a transcript of the interview or the final thesis text, please feel free to contact me. My email address is yizhi.yao@wur.nl. Thank you for your participation.

Interviewee 2

Interviewer: Thank you for taking the time to participate in this interview. My name is Yizhi, and this interview is part of my graduate thesis, which will take approximately 15 minutes. Before we begin, I want to inform you that you have already agreed to participate in this interview and have consented to the recording of the interview. The recording will only be used for research data analysis and interview transcription, and your privacy and anonymity will be protected.

Interviewer: Before we start, I would like to clarify some terms. All the food in this interview is insect-based human snacks, including insect cookies, insect oat bars, and insect potato chips, among others. Now, you can take a look at the first set of pictures, which includes samples of insect snacks, such as insect oat bars, insect cookies, insect crackers, and insect potato chips.

Interviewer: Okay, the purpose of this interview is to understand the feelings of young Chinese consumers towards insect-based snacks and the factors that influence their acceptance. The interview is divided into five sections, and all the questions are open-ended, with no right or wrong answers. You can share your thoughts freely. So, the first question is, how old are you?

Interviewee 2: I am 24.

Interviewer: What is your level of education?

Interviewee 2: I have a master's degree.

Interviewer: Great. Which ethnic group do you belong to?

Interviewee 2: I belong to the Miao ethnic group.

Interviewer: Where did you grow up, and where do you currently live?

Interviewee 2: I grew up in Guizhou, and I currently live in Kunming.

Interviewer: How many people are there in your household?

Interviewee 2: There are four people in my household.

Interviewer: Okay, have you tried insect-based food before?

Interviewee 2: Yes, I have tried it.

Interviewer: Can you share your feelings about your experience?

Interviewee 2: Sure, I feel that in the southwestern region, there are quite a few insect-based foods available. I have tried some of the common ones in our area, like bee pupae, bamboo worms, and slightly larger silkworm pupae. Personally, I'm quite afraid of bamboo worms, but I love spicy bee pupae. The texture of both, when paired with chili powder, is quite good, but bamboo worms feel too dry and lack the richness of protein. They feel fine and tight, like

eating empty shells. As for the silkworm pupae, I found them to be too large and somewhat thick. The two times I tried them, they didn't seem very fresh, and the overall experience wasn't great. However, for bee pupae, we make them fresh at home every year when they are in season.

Interviewer: I see. Okay, moving on, let's talk about your perceptions of insect-based food, specifically the visual experience. When you think about the appearance of insect snacks, what comes to mind?

Interviewee 2: I think my initial reaction is that they might look like the insects I've seen or eaten before, with their insect-like shapes. In terms of size, they might be like small crispy snacks, packed in small bags, with different bags containing different types of insects. I might imagine one bag contains bamboo worms, another contains bee pupae, and another contains grasshoppers, for example. They all have an insect-like appearance, and they might look somewhat dehydrated.

Interviewer: So, are you saying that they are fried insects in individual bags, and they retain their original appearance?

Interviewee 2: Yes, that's right. Even though they might have been processed and packaged, they still retain their original shapes. That's my first impression.

Interviewer: Alright, how do these visual experiences make you feel? Do you find them scary or not?

Interviewee 2: I find them quite scary because I'm personally afraid of insects. If I were to try eating insects, it would be purely because of their freshness. For example, people around me eat them, and they try to persuade me to give it a shot. After trying, you realize that it's not as scary as you imagined, and you start to eat them. But I think it's important that they are fresh. There's a significant difference in taste between fresh bee pupae and frozen bee pupae. So, if I were to accept their insect-like appearance and eat them, it would be because I want to eat fresh insects. But if they are dehydrated or frozen and still presented to me, I would find it quite scary.

Interviewer: I understand. Okay, next, let's talk about your perceptions of the texture, such as it being somewhat dehydrated or having a rich and juicy texture. What do you imagine the taste to be like? Sweet, sour, bitter, spicy, salty, or something else?

Interviewee 2: I imagine it to be somewhat on the salty side, which might be related to the region I come from. It's a subconscious reaction, and it's closer to what I'm used to eating. I can't really imagine it being sweet because I haven't tried it or seen it.

Interviewer: I see. How do these flavors, like being somewhat salty and having a certain texture, make you feel?

Interviewee 2: I feel that if I don't think of them as insects, they are just regular food with nothing particularly special about them. Some of them have a rounded shape, a bit like having a shell with some protein filling in the middle. It's okay to eat. I think the main issue is the initial appearance, which can be scary, but once you get past that, there's nothing much to it.

Interviewer: Understood. Okay, lastly, let's discuss the smell or the olfactory experience. When you think about insect-based snacks, what kind of smell do you associate with them?

Interviewee 2: I think they might be odorless, not having a strong scent. Alternatively, they might have a natural and earthy aroma, like a slight earthy or muddy smell. However, it's not something that's very off-putting.

Interviewer: I see. Okay, with these sensory experiences in mind, including the visual, taste, and smell, do you think any of these aspects are more important when it comes to choosing insect-based snacks? If so, why?

Interviewee 2: Well, I think it's primarily about the visual aspect, followed by taste and then smell. The first impression I get from looking at the food determines whether I would be willing to try and accept it. As I mentioned earlier, I have a fear of insects, so if it looks scary, I won't accept it. Taste also plays a role because if people keep telling me it's delicious, I might be willing to try it because I'm generally open to trying new and unique flavors.

Interviewer: Okay, now I'd like to understand some other factors that might affect your willingness to consume insect-based snacks. Besides the sensory attributes we discussed, what other factors would you pay attention to when buying insect-based snacks?

Interviewee 2: I think safety is a significant factor. When it comes to a product like insects, it can be challenging to imagine it as a snack. So, safety is crucial. Food safety, in general, is important because you never know what processes or additives have been used in the production of these products. As a consumer who might not be well-versed in these matters, I would look for reassurances in terms of safety, like national safety certifications. It has to be established as safe before anything else.

Interviewer: Alright, if you knew it was very healthy, would that make you more willing to try it?

Interviewee 2: If it's marketed as healthy and packed with vitamins or beneficial for health, I might consider trying it. However, it wouldn't necessarily lead to repeat purchases. Health aspects alone wouldn't be the main driving force for me. I would still prioritize taste and safety.

Interviewer: Understood. So, in comparison, do you think safety is a more critical factor for you than health or taste?

Interviewee 2: Yes, I believe safety is more critical.

Interviewer: Alright, do you think the brand of the product would influence your decision?

Interviewee 2: Yes, the brand would have a significant influence. In the current market, there are so many brands, and within each type of product, there is a wide variety. If a product has a well-known and reputable brand, it would make me more likely to choose it because it suggests a certain level of quality and safety. If I were to choose a completely unknown brand, I might be hesitant because I wouldn't have the same level of trust.

Interviewer: Do you think advertising and promotion would impact your desire to purchase the product?

Interviewee 2: I believe it would, especially in this era where people use smartphones and engage with social media frequently. Advertising on platforms like Xiaohongshu, Taobao, or Weibo can have a significant impact. Even if it's perceived as advertising, the frequent exposure to the product might make me feel like the brand is investing in making the product better. Additionally, if friends recommend it, that would also influence my decision.

Interviewer: Now, I'd like to show you some images. These are thin crispy crackers made from cricket powder. They have a texture and consistency similar to regular crackers. What are your thoughts on them, and would you consume them?

Interviewee 2: I would consider trying them if I saw this image. However, my decision to try them would likely depend on recommendations from friends or if I've come across positive reviews on social media. If I don't have those influencing factors, I might not venture to try something I'm not familiar with.

Interviewer: If you knew that two of these snacks were very environmentally friendly, for example, they used very little water or land resources for production, would that make you more interested in trying those products?

Interviewee 2: It might make me more interested because I think environmental considerations are essential these days, and people, especially young people, should pay attention to them. However, environmental friendliness alone wouldn't be enough to make me choose a product. It would still need to be safe, delicious, and have other appealing qualities. Environmental impact would be a bonus.

Interviewer: Understood. Now, I'm showing you three different packaging designs for the same product. If you were to walk into a store like Walmart and saw these three options, which one would you choose to purchase?

Interviewee 2: I would choose the third one. The first two designs prominently feature the insects, and they look very close to the actual insects, which I find somewhat off-putting. The third one appears more abstract, which I find more interesting and less intimidating. If I had to rank them, I'd choose the third one, followed by the second one because it's less detailed, and I would avoid the first one due to its realistic insect appearance.

Interviewer: If you could create your own snack, what would it look like? Could you list some of the ingredients, flavors, and textures you'd like to include?

Interviewee 2: When it comes to packaging, the first thing that comes to mind is potato chips because I personally enjoy them. I'd want to make something like various potato chip flavors. In terms of the snack itself, it should hide the insect’s appearance completely. The texture would need to be something I like, and it would need to be safe. It could be a potato chip or a crispy snack. If I were to make something more unique, I might consider creating candies with insect flavors, which could be fun for games and challenges rather than everyday snacks.

Interviewer: What about the information you'd like to put on the packaging? Would you emphasize its health benefits, deliciousness, or any other aspect?

Interviewee 2: I would focus on safety first, and then I would highlight the taste and deliciousness. I would also add some eye-catching elements to the packaging. However, I wouldn't use the actual image of insects because it might deter potential customers. Instead, I might use cartoon images of insects to make it look cute and appealing.

Interviewer: Now, there are already insect-based foods available in the Chinese market, like fried crickets and silkworm pupae, and many young people have accepted them. However, there aren't insect-based snacks available yet. Are you looking forward to the introduction of insect-based snacks to the market?

Interviewee 2: Personally, I'm not eagerly anticipating it because I already have preferred snack brands and know what I like. I might not be inclined to try something new. Besides, I don't have a particular liking for insects, so my interest in insect-based snacks is relatively average.

Interviewer: What do you think would be necessary to introduce insect-based snacks to the Chinese market for young people?

Interviewee 2: I believe it would depend on the taste, packaging, and marketing. First, it's crucial to ensure that the taste aligns with the primary product category, whether it's cookies, chips, or energy bars. Once the product category is established, it needs to have distinct characteristics that make it competitive in the market. It could be because it's a quick and delicious source of vitamins, for example. Finally, a significant investment in marketing would be necessary to create awareness and generate positive reviews and recommendations among Chinese consumers.

Interviewer Alright, I see, that's all of my questions. Thank you for your participation. Is there anything else you'd like to add?

Interviewee 2: No.

Interviewer Alright, well, this concludes our interview for now. I really appreciate your time and your insights, which are very valuable for my project. I will transcribe this interview, and if you would like to receive the final transcript and a copy of the paper, please feel free to contact me anytime. My email address is yizhi.yao@wur.nl.

Interviewee 3

Interviewer：Thank you for taking the time to participate in this interview. My name is Yizhi. This interview is part of my graduate thesis and will take approximately 15 minutes. Before we begin, I would like to inform you that you have agreed to participate in this interview and consented to the recording. This recording will be used solely for research data analysis and interview transcription, and all privacy and anonymity will be protected.

Interviewer: Before we start, I'd like to clarify some terms used in the interview. All the food items mentioned are human snacks made from edible insects, such as insect biscuits, insect oat bars, and insect potato chips, among others.

Interviewer: Alright, the purpose of this interview is to gain a deeper understanding of how young Chinese consumers feel about insect snacks and the factors that influence their acceptance. The interview will be divided into 5 sections, and all questions are open-ended, so feel free to express your thoughts.

Interviewer: Now, let's start with some general questions. How old are you?

Interviewee 3: I'm 22 years old.

Interviewer: 22, great. What is your educational background?

Interviewee 3: I have a bachelor's degree.

Interviewer: Which ethnic group do you belong to?

Interviewee 3: I'm Han Chinese.

Interviewer: Where did you grow up, and where do you currently live?

Interviewee 3: I grew up in Hangzhou, Zhejiang, and I currently live there.

Interviewer: Okay. How many people are there in your household?

Interviewee 3: There are three people in my family now.

Interviewer: Three, I see. Have you ever tried insect snacks before?

Interviewee 3: No, I've never thought about such products.

Interviewer: Have you ever tried insect food?

Interviewee 3: No, I haven't.

Interviewer: Okay. Do you see any differences between insect snacks and insect food?

Interviewee 3: Food can be eaten as the main dish to satisfy hunger, while snacks are more of an accessory, for entertainment or to diversify flavors.

Interviewer: Alright, now let's discuss your sensory experiences with insect snacks. When you think of insect snacks, what do you imagine in terms of their appearance, such as their shape, color, and size?

Interviewee 3: For insect snacks, I think they might be dark or yellowish, with a crispy texture, and they might have a strong aroma.

Interviewer: What about their size and shape?

Interviewee 3: I can't really imagine the shape, but I would expect them to be small since insects are naturally small.

Interviewer: Now, when you see the images of various insect snacks available in the market, do you have any new visual experiences and thoughts?

Interviewee 3: I think I would immediately associate them with the packaging of potato chips. They might have rich colors to attract people, possibly with a bit of visual impact. However, I wouldn't try them.

Interviewer: Could you explain why you wouldn't try them?

Interviewee 3: Firstly, there is a wide variety of food available, so I don't see the need to choose insect snacks. Secondly, the colors associated with insects appear repulsive to me. My subconscious perception of insects is that they are dark, dirty, and carry bacteria and viruses. I wouldn't eat these things unless they are used as medicine, like traditional Chinese medicine, which I can accept.

Interviewer: Alright, now let's discuss your gustatory experiences with insect snacks. When you think of insect snacks, what flavors and textures come to mind?

Interviewee 3: In terms of taste, I would expect them to be somewhat salty. As for the texture, I haven't tried them, so I would guess they are crispy and fragrant.

Interviewer: Regarding insect snacks, what kind of texture and flavor do you think would be the most appealing?

Interviewee 3: I would prefer them to be crispy, and in terms of taste, I'd lean toward a spicy or barbecue flavor. I think that would be more appealing.

Interviewer: Understood. Now, let's discuss the olfactory experience. When you think of insect snacks, can you describe the aromas associated with them?

Interviewee 3: I would think of the aroma of street food, like the kind you find in a night market with various vendors selling different foods. It could be the aroma of potato chips or grilled lamb skewers, similar to barbecue.

Interviewer: Do you find the aromas of these insect snacks acceptable and pleasant?

Interviewee 3: If it wasn't made from insects, I might find it acceptable. But if it's insect-made, I wouldn't try it because I have an ingrained aversion to insects and consider them unhygienic.

Interviewer: Alright, among the sensory experiences we just discussed, including visual, taste, and smell, which one do you consider the most important when choosing insect snacks? Why?

Interviewee 3: I would say visual perception is the most important because our initial selection is based on what we see. If the visual aspect doesn't appeal to us, we won't proceed to the next step. If it passes the visual test, I would then assess its taste, brand, and other factors. If the visual aspect doesn't pass, I would immediately eliminate the product.

Interviewee 3: Alright, next, I'd like to understand the product attributes that influence your purchase decisions. Besides the sensory attributes we discussed earlier, are there any other factors you consider when buying insect snacks?

Interviewee 3: I might check the ingredient list. I would examine the ingredients to see if they would be harmful to my health or if there are too many additives or sugars. If the ingredients seem safe, I might be more willing to consider insect snacks. However, this is based on the assumption that I can accept insect snacks in the first place.

Interviewer: So, you place a significant emphasis on health, right?

Interviewee 3: Yes, I prefer to eat something that I feel safe consuming.

Interviewer: Do you also consider safety, such as whether the packaging is secure or if it's environmentally friendly?

Interviewee 3: Oh, safety is essential. I'm concerned about food hygiene issues in China. I'm afraid that these insect snacks might not be properly disinfected or might have contamination issues during the manufacturing process. For example, if they get mixed with roaches and then processed into biscuits, that's quite terrifying.

Interviewer: I see, so safety and health are two essential product characteristics for you.

Interviewee 3: Yes, that's right.

Interviewer: Great. Now, I'd like to show you a set of thin crispy biscuits made from cricket flour. These biscuits have a taste and texture similar to regular biscuits. What are your thoughts on them? Would you consume them?

Interviewee 3: I wouldn't eat them. I still have an aversion to insects, so I wouldn't try them.

Interviewer: I'd like to confirm if your aversion primarily stems from fear or if you consider them unhygienic.

Interviewee 3: I think it's a bit of both.

Interviewer: Okay. If you were looking for a snack, which of the three products would you prefer? Why?

Interviewee 3: I'd choose the third one because it doesn't visibly resemble insects. The first two have prominent images of insects on the packaging, which I find hard to accept.

Interviewer: Okay, now, if you knew that the two options you didn't choose were more environmentally friendly, for example, they had a lower environmental impact and used less water, would that make you more willing to try the other two products? Why or why not?

Interviewee 3: Yes, I think that taking care of our planet is important because we live on Earth. If the differences between the products are not significant and they are all snacks, I believe I could sacrifice some of my visual preferences for the sake of the environment.

Interviewer: So, you prioritize safety, health, and brand trust above environmental concerns.

Interviewee 3: That's correct.

Interviewer: Alright, let's move on to ranking these product attributes based on their importance to you. Please rank them from most important to least important.

Interviewee 3: I would say safety is the most important, followed by health. If something isn't safe, it won't be healthy either. Then, the brand and manufacturer come next, and lastly, environmental friendliness.

Interviewer: So, your order of importance is safety, health, brand and manufacturer, and then environmental friendliness.

Interviewee 3: Yes, that's right.

Interviewer: Great. If you had the opportunity to create your own insect snack, what flavor, ingredients, texture, and packaging would you choose?

Interviewee 3: I might deep-fry it and add some spices, perhaps a spicy or barbecue flavor. For the packaging, I would use colorful and eye-catching designs. I might include some cartoon images on the packaging. I would primarily target young children, such as elementary school students, for promotion. I believe children would be more receptive, and then gradually expand to adults.

Interviewer: Alright, now, there are insect food products available in the Chinese market, like fried grasshoppers and roasted silkworm pupae. Many young people accept them. However, there are no insect snacks available in the Chinese market yet. Do you hope that the Chinese market will introduce insect snacks in the future? Why?

Interviewee 3: I have some curiosity, so I hope to see how people's acceptance of this new product develops.

Interviewer: Understood. If you believe it's necessary to promote insect snacks to young people in China in the future, what do you think needs to be done? Any efforts or strategies?

Interviewee 3: To promote insect snacks, it's quite challenging because everyone has different tastes. Some people have an inherent aversion to eating insects. Therefore, it should be a personalized approach. Focusing on advertising and marketing could work, and those who are receptive to it will naturally try it, while those who have deep-seated fears might never change their minds.

Interviewer: So, overcoming certain fears might be a challenge.

Interviewee 3: Yes, I think that's the case.

Interviewer: Alright, marketing mainly relies on advertising. In terms of advertising, which aspect do you think would most encourage consumption?

Interviewee 3: Regarding advertising, I think it might be about highlighting the nutritional aspects, like the high protein content. So, focusing on the nutritional benefits could be effective.

Interviewer: So, nutrition is a more critical aspect than environmental friendliness.

Interviewee 3: Yes.

Interviewer: Alright, that concludes this interview. Thank you for your participation. Do you have any other questions before we finish?

Interviewee 3: I'd like to ask if you personally accept insects.

Interviewer: I also have some aversion to insects, primarily due to their appearance. So, I also find it challenging to accept.

Interviewee 3: Haha, I see.

Interviewer: Alright, well, this interview comes to an end. Thank you for your time and insights. My project greatly appreciates it. If you'd like the final interview transcript, you can contact me anytime at my email address, which is yizhi.yao@wur.nl. Thank you.

Interviewee 4

Interviewer：Thank you for taking the time to participate in this interview. My name is Yizhi. This interview is part of my graduate thesis and will take approximately 15 minutes. Before we begin, I would like to inform you that you have agreed to participate in this interview and consented to the recording. This recording will be used solely for research data analysis and interview transcription, and all privacy and anonymity will be protected.

Interviewer: Before we start, I'd like to clarify some terms used in the interview. All the food items mentioned are human snacks made from edible insects, such as insect biscuits, insect oat bars, and insect potato chips, among others.

Interviewer: Alright, the purpose of this interview is to gain a deeper understanding of how young Chinese consumers feel about insect snacks and the factors that influence their acceptance. The interview will be divided into 5 sections, and all questions are open-ended, so feel free to express your thoughts.

Interviewer: Now, let's start with some general questions. How old are you?

Interviewee 4: I'm 25 years old.

Interviewer: Cool, what is your educational background?

Interviewee 3: I am pursuing my Master’s degree.

Interviewer: Okay, which ethnic group do you belong to?

Interviewee 3: I'm Han Chinese.

Interviewer: Where did you grow up, and where do you currently live?

Interviewee 3: Shaoxing, Zhejiang,.

Interviewer: Okay. How many people are there in your household?

Interviewee 3: There are three people in my family now.

Interviewer: Three, I see. Have you ever tried insect snacks before?

Interviewer: Have you ever tried insect snacks before?

Interviewee 4: No.

Interviewer: Alright, have you ever tried insect food?

Interviewee 4: I have tried insect food.

Interviewer: Alright, what is insect food? Could you share your experience?

Interviewee 4: Are you referring to my experience with what I've eaten?

Interviewer: Yes.

Interviewee 4: I've eaten grasshoppers, which were deep-fried and skewered like grilled lamb skewers, with seasoning similar to that used on barbecue.

Interviewer: How did you find the taste?

Interviewee 4: It was quite tasty and had a nice flavor.

Interviewer: So, you are quite accepting of it, right?

Interviewee 4: Yes, I don't have a fear of insects.

Interviewer: Okay, do you think there are differences between insect snacks and insect food?

Interviewee 4: Snacks are more finely processed, like incorporating insects into potato chips, which is a new concept. Insect food is more like dishes made from insects, such as grasshoppers and crickets.

Interviewer: Alright, now let's discuss your visual experience. When you think of insect snacks, what do you imagine in terms of their appearance, such as their shape, color, and size? And what feelings do you have about them?

Interviewee 4: My feelings are not very strong. In terms of appearance, they might be dark, and in terms of size, they would be similar to the actual size of insects. When it comes to insect snacks, the initial focus is probably on how they look. However, the primary consideration is still the taste. For example, when you eat cucumber potato chips, you are more focused on the taste of the cucumber rather than its appearance.

Interviewer: Alright, after looking at these images of insect snacks, such as insect biscuits and insect oat bars, what feelings do you have about insect snacks?

Interviewee 4: I feel the taste should be good.

Interviewer: Alright, now let's discuss your gustatory experience with insect snacks. When you think of insect snacks, what flavors and textures come to mind?

Interviewee 4: In terms of taste, I would expect something like a barbecue flavor, with a strong, salty, and somewhat crispy texture.

Interviewer: So, slightly salty and leaning towards a barbecue flavor would be more appealing to you?

Interviewee 4: Yes, that's what I prefer.

Interviewer: Now, let's discuss the olfactory experience. When you think of insect snacks, can you describe the aromas associated with them?

Interviewee 4: I would expect them to have a pleasant aroma, similar to scallion oil pancakes, salt and pepper chips, or potato chips.

Interviewer: Do you find these aromas acceptable and pleasant?

Interviewee 4: Yes, I find them acceptable.

Interviewer: So, among the sensory experiences we discussed, including visual, taste, and smell, which one do you consider the most important when choosing insect snacks?

Interviewee 4: I would say taste is the most important because when trying a new product for the first time, the initial impression is primarily based on taste. After the first try, visual appeal is less important.

Interviewer: Alright, let's discuss the product attributes that influence your purchase decisions. Besides the sensory attributes, such as taste and visual appeal, are there any other factors you consider when buying insect snacks? Things like hygiene, brand, or price?

Interviewee 4: I would consider the hygiene and safety of the product. I want to make sure it won't make me sick. The brand and the quality standards are also important. If the product appears safe and is reasonably priced, I would be more likely to try it.

Interviewer: So, safety, hygiene, and brand reputation are key factors for you?

Interviewee 4: Yes, they are.

Interviewer: Do you also consider packaging and environmental friendliness?

Interviewee 4: Packaging should at least give me the impression of being trustworthy and hygienic. Environmental friendliness would be a consideration in certain situations where everyone is talking about it.

Interviewer: Alright, now I'd like to show you a set of thin crispy biscuits made from cricket flour. They have a similar taste and texture to regular biscuits. Would you consider trying and consuming them?

Interviewee 4: I would probably try them.

Interviewer: Why would you try them?

Interviewee 4: I think it's the novelty and curiosity. I'm curious about the taste.

Interviewer: If you were looking for a snack and had to choose one of these three products, which one would you prefer and why?

Interviewee 4: I would choose the third one, the one on the right. The packaging is more suitable for me.

Interviewer: What do you like about the packaging?

Interviewee 4: It's in a cylindrical shape, similar to a can of potato chips. Even though it has a hole in it, it gives me the impression of being healthier and more hygienic.

Interviewer: If you knew that the other two products you didn't choose were more environmentally friendly, for example, had a lower environmental impact and used fewer resources, would that make you more willing to try them? Why or why not?

Interviewee 4: If environmental friendliness is clearly highlighted in the product's promotion, I might consider the first one, the one I didn't choose. I wasn't fond of the appearance of the second one with the prominent insect imagery.

Interviewer: Why didn't you like the appearance of the second one?

Interviewee 4: It's just that it features a pure insect image, and I'm not very fond of the color either.

Interviewer: Now, let's rank the product attributes in order of importance to you. Please rank them from most important to least important.

Interviewee 4: From most important to least important: taste, hygiene, packaging, price, and then environmental friendliness.

Interviewer: So, taste is your highest priority, followed by hygiene, packaging, price, and environmental friendliness.

Interviewee 4: Yes, that's my order of importance.

Interviewer: Alright, if you had the opportunity to create your own insect snack, what flavor, ingredients, texture, and packaging would you choose?

Interviewee 4: I would choose flavors like salt and pepper, cumin, or tomato. For packaging, it should resemble a cylindrical can, similar to potato chips. I would emphasize the product's healthiness and its closeness to nature, ensuring that it's free from human-made chemicals and antibiotics.

Interviewer: So, you would focus on promoting its healthiness and natural aspects.

Interviewee 4: Yes, that's what I would emphasize.

Interviewer: Alright, there are insect food products available in the Chinese market, such as fried grasshoppers and roasted silkworm pupae, which many young people accept. However, there are no insect snacks available in the Chinese market yet. Do you hope that the Chinese market will introduce insect snacks in the future? Why?

Interviewee 4: I think if a product is attractive to me before it enters the market, I would be willing to try it. If it has a taste that I find acceptable, I would treat it as a snack.

Interviewer: So, whether it's insect biscuits or regular biscuits, you view them similarly.

Interviewee 4: Yes, if it's insect biscuits, it's a new experience for me, especially if my friends haven't tried them before.

Interviewer: If you believe it's necessary to promote insect snacks to young people in China in the future, what do you think needs to be done? Any efforts or strategies?

Interviewee 4: For promoting insect snacks, targeting young people is probably important, and, as I mentioned, the key is taste. If you can capture the taste preferences of young people, that's crucial. Just like potato chips – they don't represent what they were in their original country, but they've become popular in China because of their taste. Other factors are convenience and affordability.

Interviewer: So, it's both about marketing and ensuring the taste appeals to young people.

Interviewee 4: Yes, that's correct.

Interviewer: Alright, when it comes to advertising, what aspect do you think would most encourage consumption?

Interviewee 4: In terms of advertising, focusing on the taste and the product's healthiness would be effective. Highlighting that it's from nature and free from chemicals and antibiotics could be a strong selling point.

Interviewer: So, the nutritional aspect and healthiness are more crucial than environmental friendliness.

Interviewee 4: Yes.

Interviewer: Alright, that concludes this interview. Thank you for your participation. Do you have any other questions before we finish?

Interviewee 4: I have no further questions.

Interviewer: Alright, this interview comes to an end. Thank you for your time and insights. My project greatly appreciates it. If you'd like the final interview transcript, you can contact me anytime at my email address, which is yizhi.yao@wur.nl. Thank you.

Interviewee 5

Interviewer: Well, let's get started, and thank you for taking the time to participate in this interview. My name is Yizhi, and this interview is part of my graduate thesis, expected to last about 15 minutes. Before we begin, I'd like to inform you that you have consented to participate in this interview, and you have agreed to have the interview recorded. This interview will be used exclusively for research, data analysis, and interview transcription, and your privacy and anonymity will be protected.

Interviewer: Let me clarify some terms first. When we refer to "foods," we mean edible insect-based snacks, such as insect cookies, insect oatmeal bars, insect potato chips, and so on.

Interviewer: The objective of this research is to gain a deeper understanding of how young Chinese consumers feel about insect-based snacks and the factors influencing their acceptance. The interview consists of five sections, and all questions are open-ended, so feel free to express your thoughts. Now, let's get started. How old are you?

Interviewee 5: I'm 21 years old.

Interviewer: What is your educational level?

Interviewee 5: I'm in my third year of undergraduate studies.

Interviewer: Which ethnic group do you belong to?

Interviewee 5: I'm of Han ethnicity.

Interviewer: Where did you grow up, and where do you currently reside?

Interviewee 5: I grew up in Xiamen, Fujian, and currently live there.

Interviewer: Great. How many people are there in your family?

Interviewee 5: There are four people in my family.

Interviewer: Have you tried insect-based snacks before?

Interviewee 5: I haven't tried insect-based snacks, but I have tried fried crickets.

Interviewer: Could you share your experience of trying fried crickets?

Interviewee 5: When I was traveling in Guangdong with my parents when I was a child, I tried fried crickets there. I remember they looked like big bees, and they tasted crispy.

Interviewer: So, you have no aversion to eating insects, and you compare them to eating crayfish.

Interviewee 5: That's right. I'm not afraid of eating insects, and I consider them similar to crayfish, especially because they are artificially bred, which makes them cleaner. I've eaten them a few times when I was younger, and I'm not afraid of them now.

Interviewer: I understand. Now, regarding your perceptions of insect-based snacks, when you think about them, can you describe what you imagine in terms of their appearance, such as their shape, color, and size, as well as how they are prepared?

Interviewee 5: When I think of insect-based snacks, I envision two types. One is the direct frying of dried insects, which retains the original appearance of the insects, making them into salty and crispy snacks. The other type involves using insects in baking, like adding a small amount of insects to cookies or muffins, making them look similar in size and color to regular baked goods.

Interviewer: How do these visual experiences make you feel? Can you share your thoughts?

Interviewee 5: When it comes to insect crisps, they might appear scary due to their resemblance to real insects, but the frying process can make them less recognizable. As for baked goods, they don't look significantly different from regular pastries, and I think it wouldn't be a big issue.

Interviewer: I see. Now, regarding taste, what taste or texture do you imagine insect-based snacks would have?

Interviewee 5: In terms of taste and texture, I imagine they would be salty and crispy, as they are typically fried. However, the taste and texture could vary depending on the type of insect used. I've tried an ant-based snack before, and it tasted sweet, somewhat similar to peanut brittle.

Interviewer: What do these taste descriptions evoke in you in terms of thoughts or feelings?

Interviewee 5: The taste of insect snacks would vary depending on the insect used. For example, salty and crispy snacks may resemble other salty snacks, and sweet insect-based treats would be more like desserts. Overall, it doesn't bother me as long as they taste good.

Interviewer: So, the primary factor for you is the taste of the insect-based snacks.

Interviewee 5: Yes, the taste is the most important factor for me.

Interviewer: I understand. Now, let's explore the factors that would influence your acceptance of insect-based snacks. Are there any other factors you would consider when purchasing insect-based snacks?

Interviewee 5: Safety and hygiene would be important factors for me because most insect snacks are sold by small restaurants or street vendors. I would want to ensure that the place is clean and the food is handled safely.

Interviewee 5: I would also consider the price, the product's appearance and packaging, and the nutritional information. For instance, I look for snacks with a good balance of price, taste, and nutrition. The protein content is essential for me.

Interviewer: Could you elaborate on what you mean by the importance of price and the product's appearance?

Interviewee 5: Price is significant because, as a consumer, I consider the value of a product. If the price is too high, I might hesitate to buy it. Appearance is important because the packaging and visual appeal can affect my purchasing decision. If the packaging looks attractive or if the product is presented well, I would be more likely to try it.

Interviewer: I see. Now, if I were to show you a picture of an insect-based cookie made with cricket flour that tastes similar to regular cookies but has different ingredients, would you consider trying it?

Interviewee 5: I would consider trying it, but the decision would depend on how it tastes. If it's delicious, I might buy it again.

Interviewer: If you were to choose one of these three insect-based snacks, which one would you be more inclined to try?

Interviewee 5: I would be more inclined to choose the third one. The first two don't look very appetizing to me, especially the second one with its color and logo, which reminds me of insect repellent. The first one looks like pet food. The third one seems the most normal.

Interviewer: Now, if you knew that the first two snacks were more sustainable, using fewer resources in their production, and environmentally friendly, would that make you more willing to try them?

Interviewee 5: My decision would still depend on the price, taste, and overall quality of the product. While sustainability is important, it wouldn't be the sole determining factor for me.

Interviewer: Understood. Out of all the product attributes we discussed, can you rank them from most important to least important for you when purchasing insect-based snacks?

Interviewee 5: For me, safety and hygiene come first, followed by taste, price, appearance, and nutrition. Sustainability would be the least important factor for me.

Interviewer: Thank you for sharing your priorities. If you were to create your own insect-based snack, what would it look like? You can imagine your ideal ingredients, flavor, texture, appearance, and packaging and share your thoughts.

Interviewee 5: Since insect-based products are not common in China, and many people still have reservations about eating them, I would opt for a cartoon-like packaging, similar to the cricket cookie you showed earlier. Regarding taste, I would go for a sour and spicy flavor, as I believe it would provide more sensory stimulation. In terms of texture, I'd prefer it to be crispy, similar to potato chips.

Interviewer: Do you look forward to insect-based snacks being introduced to the Chinese market?

Interviewee 5: Yes, I am looking forward to it because I don't have an aversion to eating insects, and I haven't seen such products in the Chinese market. I'm curious to see what they taste like.

Interviewer: What do you think would be necessary to promote insect-based snacks among young Chinese consumers?

Interviewee 5: To promote insect-based snacks, it would be essential to establish a good marketing concept that considers the preferences of consumers. For instance, if consumers like me prioritize protein, then marketing efforts should emphasize the high protein content. Moreover, since insect-based foods are relatively new in China, changing people's perceptions and getting them to accept insects as a food source would be important. It's a process of gradual change.

Interviewer: So, understanding consumer preferences and changing perceptions are key to promoting insect-based snacks.

Interviewee 5: Yes, that's what I believe. There's still a long way to go in this regard, but since there are insect-based snack products overseas, I believe China will follow and introduce these snacks soon as well.

Interviewer: Okay, great insights. That concludes the interview. Thank you for your time and valuable insights. If you'd like the interview transcript or the final thesis text, please feel free to contact me. My email is yizhi.yao@wur.nl. Thank you for your participation.

Interviewee 6

Interviewer: Thank you for taking the time for this interview. My name is Yizhi. This interview is part of my graduate thesis and should take about 15 minutes. Before we begin, I'd like to inform you that you've agreed to participate in this interview and consented to it being recorded. This recording will be used solely for research, data analysis, and interview transcription purposes, and your privacy and anonymity will be protected.

Interviewer: Now, I'd like to clarify some terms that will be used during this interview. When we refer to "foods," we mean edible insect-based snacks, such as insect cookies, insect oatmeal bars, insect potato chips, and so on.

Interviewer: The purpose of this research is to gain a deeper understanding of how young Chinese consumers feel about insect-based snacks and the factors influencing their acceptance. The interview consists of five sections, and all questions are open-ended, so feel free to express your thoughts. Now, for the first question, let's begin with some basic personal information. How old are you?

Interviewee 6: I'm 20 years old.

Interviewer: What is your educational level?

Interviewee 6: I have a bachelor's degree.

Interviewer: Which ethnic group do you belong to?

Interviewee 6: I am Han Chinese.

Interviewer: Where did you grow up, and where do you currently reside?

Interviewee 6: I grew up in Beijing, and I currently live in Beijing.

Interviewer: Great. How many people are there in your family?

Interviewee 6: There are three people in my family.

Interviewer: Have you tried insect-based snacks before?

Interviewee 6: I haven't tried them.

Interviewer: If you haven't tried them, what is it that prevents you from trying them?

Interviewee 6: I have always been afraid of insects, and I find them dirty and unhygienic.

Interviewer: I understand. Let's move on to your perceptions of insect-based snacks. When you think about insect-based snacks, can you describe what you imagine in terms of their appearance, like their shape, color, and how they are prepared?

Interviewee 6: I imagine them as deep-fried, such as silkworm pupae and locusts. Usually, the vendor allows you to choose what you want to eat, and they fry it and season it for you.

After frying, they can be blackish-brown or golden, similar to fried chicken nuggets. However, I personally can't accept them.

Interviewer: What about their size?

Interviewee 6: They maintain the original size of the insects.

Interviewer: How do these visual experiences make you feel? Can you share your thoughts?

Interviewee 6: Well, I still find them a bit scary, like a pile of dead insects stuck together. I can't bring myself to eat them.

Interviewer: I see. Now, in terms of taste, when you think about insect-based snacks, can you describe what taste or texture you imagine they would have?

Interviewee 6: In terms of taste and texture, they might be crispy and seasoned. The taste would be savory, depending on the seasoning. Most of the insect snacks I've seen on the street are spicy.

Interviewer: Alright. What do these taste descriptions evoke in you in terms of thoughts or feelings?

Interviewee 6: If these flavors and textures were on something else, I might find them delicious and flavorful, especially in items like kebabs. However, I can't bring myself to eat insects, no matter how good the taste and texture may be. When I see them, I'm just too repelled.

Interviewer: So, the primary factor preventing you from trying insect-based snacks is your fear and disgust of insects.

Interviewee 6: Yes, that's correct.

Interviewer: I understand. Now, let's talk about olfactory experiences. When you think about consuming insects, can you describe the aroma or smell you would associate with them?

Interviewee 6: The aroma is similar to the taste I mentioned earlier—barbecue or spices, not so much the insects themselves. Insects are generally considered to be odorless, except for stink bugs.

Interviewer: Okay, thank you for sharing your thoughts. Out of the sensory experiences we discussed, which one do you find most important when considering insect-based snacks?

Interviewee 6: I would say appearance is the most important factor for me. If the appearance is unappealing, I wouldn't consider trying them, no matter how good their taste and texture might be.

Interviewer: Now, let's explore the factors that would influence your acceptance of insect-based snacks. Are there any other factors you would consider when purchasing insect-based snacks?

Interviewee 6: If I were to buy them, I'd check the ingredient list to understand what's in them. On one hand, I want to know the ingredients to ensure there's nothing I'm allergic to. On the other hand, I'd look at their nutritional content. Insects are generally high in protein, and this aspect would be appealing.

Interviewee 6: Other factors I'd consider include the price and the product's novelty.

Interviewer: Could you elaborate on what you mean by price and novelty?

Interviewee 6: Regarding price, I'd check if it's reasonably priced. Many new food items tend to be quite expensive, and if I feel the cost doesn't justify the product, I might not try it. Novelty is about the product's uniqueness. If it offers something different and appeals to my curiosity, I'd be more likely to give it a try.

Interviewer: I see. Now, if I were to show you a picture of an insect-based cookie made with cricket flour that tastes similar to regular cookies but has different ingredients, would you consider trying it?

Interviewee 6: I wouldn't try it because it has crickets in it.

Interviewer: I understand, your fear of insects remains a significant factor.

Interviewee 6: Yes.

Interviewer: If you were to choose one of these three insect-based snacks, which one would you be more inclined to try?

Interviewee 6: I'd choose the third one.

Interviewer: Can you explain your reasons for choosing that one?

Interviewee 6: It's the only one that doesn't have pictures of insects on the packaging. The others look too realistic, and I wouldn't want to touch those packages, especially the first one.

Interviewer: Now, if you knew that this snack was sustainable, using fewer resources in its production, and environmentally friendly, would that make you more willing to try it?

Interviewee 6: No, even if it's more environmentally friendly, I still wouldn't try it if I can't overcome my fear of insects.

Interviewer: Understood. Out of all the product attributes we discussed, could you rank them from most important to least important for you when purchasing insect-based snacks?

Interviewee 6: I would say appearance is the most important because it's the initial visual impact that affects my decision. Then, I'd consider health aspects to ensure I'm not allergic to anything or it doesn't have harmful ingredients. Taste and texture come next, as I eat snacks for pleasure, and price and sustainability would be the least important factors for me.

Interviewer: Thank you for sharing your priorities. If you were to create your own insect-based snack, what would it look like? You can imagine your ideal ingredients, flavor, texture, appearance, and packaging and share your thoughts.

Interviewee 6: If I were to develop such a product in the future, I would grind the insects into an unrecognizable form, so they don't resemble insects anymore. I might add a small amount to cookies. I also know there are techniques to extract insect protein, which would be great.

Interviewer: What about the taste? How would you like it to taste?

Interviewee 6: I'd make it into sweet cookies or savory sausages mixed with chicken, emphasizing the protein boost for consumers.

Interviewer: Understood. In the Chinese market, there are already insect-based foods, and many young people choose to eat them. However, there aren't insect-based snacks available in the market yet. Would you like to see insect-based snacks introduced in the future?

Interviewee 6: Personally, I wouldn't want to see them introduced because I find it disgusting and scary. It feels like I'd be eating bird food. But I understand that other people might like the idea; to each their own.

Interviewer: Can you imagine a future where insect-based snacks are widely accepted and integrated into the regular diet of Chinese consumers?

Interviewee 6: I find it hard to imagine such a future, considering my fear of insects. But if attitudes change and more people become accepting, I suppose it's possible.

Interviewer: What efforts do you think would be necessary to make Chinese consumers more accepting of these products?

Interviewee 6: I think the first step would be overcoming the fear of insects. In my case, no matter how good the product's attributes may be, my fear takes precedence. Then, advertising and emphasizing the nutritional value of insects could be beneficial because insects are highly nutritious. Lastly, having celebrities endorse and promote these products might appeal to young people, who are often drawn to novelty.

Interviewer: So, you believe the initial barrier of fear should be addressed first, followed by highlighting the positive aspects.

Interviewee 6: Yes, that's my perspective.

Interviewer: That concludes all the interview questions. Thank you for your participation. Your insights are invaluable to our project. If you'd like the interview transcript or the final thesis text, please feel free to contact me. My email is yizhi.yao@wur.nl. Thank you.

Interviewee 7

Interviewer: Thank you for taking the time for this interview. I'm Yizhi, and this interview is part of my graduate thesis, which should take about 15 minutes. Before we begin, I'd like to inform you that you've agreed to participate in this interview and consented to it being recorded. This recording will be used solely for research, data analysis, and interview transcription purposes, and your privacy and anonymity will be protected.

Interviewer: Before we start, I'd like to clarify some terms used in the interview. When we refer to "foods" throughout this interview, we mean insect-based foods, such as insect cookies, insect potato chips, insect oatmeal, and so on.

Interviewer: The purpose of this research is to gain a deeper understanding of how young Chinese consumers feel about insect-based foods and the factors influencing their acceptance. The interview consists of five sections, and all questions are open-ended, so feel free to express your thoughts. Now, for the first question, let's begin with some basic personal information. How old are you?

Interviewee 7: I'm 25 years old.

Interviewer: What is your educational level?

Interviewee 7: I have a bachelor's degree.

Interviewer: Which ethnic group do you belong to?

Interviewee 7: I am Han Chinese.

Interviewer: Where did you grow up, and where do you currently reside?

Interviewee 7: I grew up in Kunming, Yunnan, and currently live in Kunming, Yunnan.

Interviewer: Great. How many people are there in your family?

Interviewee 7: There are three people in my family.

Interviewer: Have you tried insect-based snacks before?

Interviewee 7: I have tried them.

Interviewer: What kind of products have you tried?

Interviewee 7: I tried fried crickets and fried silkworm pupae, among others.

Interviewer: What were your experiences or impressions when you tried them?

Interviewee 7: I did have an experience. Initially, when I first saw those foods, I found them intriguing. I decided to try them after recommendations from family and friends who said that these foods had high nutritional value and were beneficial for health because of their high protein content. So, my initial interest was in their nutritional value.

Interviewee 7: However, after trying them, I found that the taste was genuinely good. The fried silkworm pupae and crickets, and even dishes like fried spiders and dragonflies, had a unique and delightful taste. The second time I tried them, it wasn't just because of their nutritional value, but also because of their flavor.

Interviewer: I see. You mentioned that nutritional value influenced you initially. Were these recommendations related to the nutritional aspect?

Interviewee 7: Yes, initially, it was about the nutritional value. The taste became an important factor once I experienced it.

Interviewer: Got it. You also mentioned that you've tried insect snacks, and when it comes to insect-based foods and insect snacks, do you see any differences between them?

Interviewee 7: I haven't really thought about it. I consider insect snacks to be a type of insect-based food. For example, fried crickets could be seen as both an insect snack and an insect-based food. I eat them as snacks, but they are also a type of food.

Interviewer: So, for you, there isn't much of a distinction between insect-based foods and insect snacks?

Interviewee 7: I don't see a significant difference.

Interviewer: Understood. Now, let's talk about your sensory experiences. When you think about insect foods or snacks, can you describe what you imagine in terms of their appearance, like their shape, color, and how they are cooked?

Interviewee 7: Based on what I've seen, my first encounter with insect foods was typically fried, and they had a golden, crispy appearance. They had a crunchy texture due to the frying process.

Interviewer: So, most of your exposure has been to street-side vendors selling fried insects that closely resemble their original appearance in terms of shape and size, right?

Interviewee 7: That's correct.

Interviewer: Now, I'm going to show you some pictures of insect-based snacks that are available in the market. These images represent various insect-based snack products. What visual experiences and thoughts do these images bring to your mind?

Interviewee 7: If we're talking about insect snacks like insect potato chips, insect cookies, or insect oatmeal, I'd imagine that they might have a color similar to the original insects. Insects typically have protective colors that resemble those of tree bark, so I'd think of shades like brown with a hint of green. I'd visualize these products having those colors.

Interviewee 7: In terms of size, I believe they'd be similar to regular cookies, around the size of ordinary cookies like Oreos. If they are made into cookies, I don't think they'd have many legs or antennae visible because that could be off-putting. They might look like they are made from finely ground insect powder, so they don't resemble a whole insect.

Interviewee 7: I'd also imagine the packaging to be quite clean and modern. The packages would have pictures of the insects to emphasize their origin, but the products themselves wouldn't resemble whole insects. Instead, they'd be visually appealing in terms of their appearance as snacks.

Interviewer: Thank you for sharing your thoughts on the visual aspect of insect-based snacks. Now, in terms of taste, can you describe what you imagine the taste of these insect-based snacks would be like?

Interviewee 7: I imagine the taste to be less intense than whole insects. While whole insects have a more concentrated flavor due to their exoskeleton, I think insect-based snacks would have a milder taste. The taste might be somewhat nutty, earthy, or umami. It would be enjoyable and not overpowering, making them suitable as snacks.

Interviewer: So, you expect a more subtle flavor compared to whole insects, and you associate it with nutty or earthy notes. Would you say that this milder taste is more appealing to you than the stronger taste of whole insects?

Interviewee 7: I think so. For everyday snacking, a milder taste would be more appealing because it would be easier to consume without any hesitation. Whole insects are a bit too intense for everyday snacking, but milder-flavored insect-based snacks would be more suitable and acceptable to a broader audience.

Interviewer: That's an interesting perspective. Now, moving on to the factors that might influence your acceptance of insect-based snacks, can you think of any factors that would make you more likely to try or consume these products?

Interviewee 7: Certainly. One key factor is the trustworthiness of the brand. If the brand is reputable and has a history of producing safe and high-quality products, I'd be more willing to try their insect-based snacks. Safety and quality are paramount because there's still a stigma associated with insects as food. If a brand can assure me that their products are safe, I'd be more inclined to try them.

Interviewee 7: Another factor is the way they are marketed. If the marketing is done creatively and focuses on the nutritional benefits, sustainability, and environmental advantages of insect-based snacks, it could pique my interest. Additionally, if there are tasting events or samples available, I'd be more willing to give them a try.

Interviewer: Trust in the brand, marketing emphasizing nutritional and environmental benefits, and tasting events or samples are all important factors for you. Are there any factors that would discourage you from trying or consuming insect-based snacks?

Interviewee 7: If there's a lack of transparency regarding the ingredients or sources of insects, that would be a major deterrent. I'd want to know where the insects come from and how they are processed. If a brand is not forthcoming about this information, I'd be skeptical.

Interviewee 7: Additionally, if there are any concerns related to allergies or food safety, such as cross-contamination with allergens, that would be a big red flag for me. I have food

allergies, and knowing that insect-based snacks are produced in facilities that take allergies seriously and have proper labeling would be crucial.

Interviewee 7: Lastly, if the price of insect-based snacks is significantly higher than traditional snacks with similar nutritional profiles, that might be a factor discouraging me from trying them.

Interviewer: So, transparency about ingredients and sources, addressing allergy and safety concerns, and price competitiveness are all significant factors that could deter you from trying insect-based snacks. Thank you for sharing your insights. Is there anything else you'd like to add about your thoughts on insect-based foods or snacks before we conclude?

Interviewee 7: Overall, I think insect-based foods and snacks have great potential. However, for wider acceptance, it's important for brands to focus on safety, quality, and marketing that highlights the benefits of these products. I believe that education and raising awareness about the sustainability and nutritional advantages of insect-based snacks could play a significant role in encouraging more people to try them.

Interviewer: Thank you for your valuable input and insights. Your insights will be valuable for my research. If you have any questions, you can always reach out to me at yizhi.yao@wur.nl.

Interviewee 8

Interviewer: Thank you for taking the time to participate in this interview. My name is Yizhi. This interview is part of my graduate thesis and will take about 15 minutes. Before we begin, I want to inform you that you have agreed to participate in the interview and consented to it being recorded. This recording will only be used for experimental analysis and interview data transcription, and your privacy and anonymity will be protected.

Interviewer: Before we start, I'd like to clarify some terms mentioned during the interview. The foods mentioned in the interview are snacks made from edible insects, including insect cookies, insect oat bars, insect chips, and so on.

Interviewee 8: Alright.

Interviewer: Now, I'd like to briefly explain the purpose of this research, which is to gain a deeper understanding of how young Chinese consumers perceive insect snacks and the factors that influence their acceptance. The interview consists of five parts, and all questions are open-ended with no right or wrong answers. So, feel free to share your thoughts. Okay, let's move on to the first part of the interview. The first question: How old are you?

Interviewee 8: I'm 24.

Interviewer: Great. What is your current level of education?

Interviewee 8: I have a bachelor's degree and I'm currently pursuing my master's.

Interviewer: What is your ethnicity?

Interviewee 8: I'm Han Chinese.

Interviewer: Where did you grow up, and where do you currently live?

Interviewee 8: I grew up in Shanghai, China, and I still live there.

Interviewer: How many people are there in your household?

Interviewee 8: There are three people in my household.

Interviewer: Have you ever tried insect snacks before?

Interviewee 8: I don't think so.

Interviewer: What about insect food? Have you ever tried that?

Interviewee 8: No, I haven't.

Interviewer: If not, what reasons have prevented you from trying them?

Interviewee 8: It's a sort of physical aversion. I find it quite disgusting, and I have some fear as well.

Interviewer: Alright. Do you think there's a difference between insect snacks and insect food?

Interviewee 8: I think insect snacks might resemble something like biscuits or pastries. You can't see the insect's shape and appearance. Insect food, on the other hand, is like a dish with whole insects, or the kind of fried insects you might see by the roadside.

Interviewer: I see. So, the main difference between insect snacks and insect food is that insect snacks are processed to the point where you can't see the insects, while insect food retains the appearance of the insects.

Interviewee 8: Yes, more or less.

Interviewer: Alright, let's talk about your visual experience. When you think of insect snacks or insect food, what do you imagine? Can you describe what it looks like, including its shape, color, and size?

Interviewee 8: I might first think of something like insect biscuits, where they have dried ants, for example, crushed and mixed into the biscuit. So, there might be some parts of the insect's body inside. The color would be close to the original color of the biscuit. If it's just the dried insect that you eat directly, it would be a grayish-brown color.

Interviewer: I see. How do these visual experiences make you feel?

Interviewee 8: If the product is processed to the point where you can't tell there are insects inside, I might be able to accept it. But if I know it contains insects, I might not find it very appetizing, and I wouldn't want to try it.

Interviewer: Do you find it disgusting or just unappetizing?

Interviewee 8: It's more of a feeling of fear and also depends on the type of insect used. If it's ants, I might be more accepting, but if it's something else with more legs or a larger, darker body, I wouldn't be comfortable with it.

Interviewer: Okay, let's talk about taste experience. When you think of eating insect snacks, what flavors and textures come to mind? For example, sweet, sour, bitter, spicy, salty, soft, chewy, crunchy, etc.

Interviewee 8: It would likely be crunchy, and the color would probably be on the darker side.

Interviewer: How would you describe the taste, sweet, sour, bitter, spicy, salty?

Interviewee 8: I would say salty.

Interviewer: I see. So, how do these flavor descriptions make you feel? Do they make you think it's delicious or unappetizing?

Interviewee 8: It makes me feel a bit disgusted. Even though I might not have a problem with the taste of the product itself, if I know it contains insects, I might not find it particularly delicious and wouldn't want to try it.

Interviewer: I understand. So, you find the taste acceptable, but if you associate it with insects, your perception of the taste diminishes, right?

Interviewee 8: Yes, that's correct. Alright, let's move on to the olfactory experience. When you think of insect snacks, can you describe their smell?

Interviewee 8: In terms of smell, it might not be very pleasant, perhaps a bit unpleasant.

Interviewer: Unpleasant? Can you describe the unpleasant odor?

Interviewee 8: Well, what I imagine is the kind of insect snacks you find in Yunnan, the ones that are fried or prepared without thorough processing. I feel like they haven't been properly processed, and some dirt and other things are in there. When you eat them, aside from consuming their heads, you might be eating their insides, feces, and so on. I would imagine the smell to be a bit animal-like and unpleasant, like an insect's pungent odor.

Interviewer: Do you think the way you perceive these sensory experiences, including visual, taste, and smell, plays a role in your choice to accept or reject insect snacks?

Interviewee 8: I think the appearance is the most important. If a snack looks scary and unappetizing, like something out of a horror movie, I wouldn't even consider buying it, and I wouldn't want to explore its taste, smell, or other aspects. If a product's appearance is not too challenging to accept, it may resemble regular snacks I'm familiar with. This makes it easier for me to try it. But I personally don't have a strong aversion to insects, so if a friend recommends it, I would be willing to give it a try.

Interviewer: I see. Now, please take a look at the second picture below, which features three similar snack products made with cricket powder. They taste similar to regular supermarket biscuits. How do you feel about these products? Would you try them?

Interviewee 8: I might give it a try.

Interviewer: Would you continue to eat them?

Interviewee 8: If I try it and it tastes good, I would continue to eat them.

Interviewer: So, you find them acceptable?

Interviewee 8: Yes, I do.

Interviewer: What factors would lead you to accept them? For example, is it because they don't look as scary, or because you're curious to know what cricket tastes like?

Interviewee 8: The main reason is that the appearance of this product doesn't seem too challenging for me to accept. It looks just like ordinary biscuits, and when I think about it, I

imagine the taste of biscuits. If it's made with crickets, I can still accept it because I don't have a strong aversion to crickets. So, if a friend recommends it, I'd be willing to try it.

Interviewer: I understand.

Interviewee 8: Additionally, I feel that insects are rich in protein, and that might also influence my decision. I probably wouldn't eat it solely for the taste, as I feel like the snacks available on the market already satisfy my taste preferences.

Interviewer: Alright. Now, please take a look at the three images below. There are three different snack products. If you were in a Walmart and wanted to choose a snack, and you saw these three options, which one would you be inclined to pick?

Interviewee 8: The third one.

Interviewer: Why the third one?

Interviewee 8: It's similar to the cricket biscuit we discussed earlier. If you show me a product that looks just like regular biscuits, I might associate it with the biscuits I often eat, and the image of an insect doesn't immediately come to mind. But with the first and second images, I immediately start visualizing various insects like grasshoppers, silkworm pupae, crickets, cockroaches, and so on. The more I think about it, the dirtier and more disgusting it feels, and it becomes something I cannot accept.

Interviewer: If you knew that the first and second products were more environmentally friendly, would you still prefer the third one?

Interviewee 8: I'd still prefer the third one. Even if the first two are more environmentally friendly, if I can't accept the product, I still wouldn't buy it.

Interviewer: Alright, let's consider all the product attributes you've discussed, including taste, health, safety, packaging, organic, and environmental sustainability. Among all these factors, which one matters most to you?

Interviewee 8: First is packaging.

Interviewer: Packaging is the most important?

Interviewee 8: Yes, it's important that I can't tell it's insects.

Interviewer: What's next in importance for you?

Interviewee 8: Taste. If the taste is not good, I wouldn't purchase it. Then comes health, and after that, health again. Environmental sustainability is probably last.

Interviewer: I see.

Interviewer: Now, if you could create your own insect snack, what would it look like? You can imagine what ingredients you would add, what flavors, appearance, packaging, and so on.

Interviewee 8: I might choose insect categories that I find acceptable, such as ants. I would crush them and mix them into the dough to make biscuits. I'd also add a lot of cream, milk, and sugar, and mix them in such a way that it's impossible to tell there are insects inside. It would be challenging to imagine that there are insects inside, and you wouldn't be able to see them or their characteristics.

Interviewee 8: So, you might change its appearance to make it unrecognizable as insects, right?

Interviewee 8: Yes.

Interviewer: What kind of taste would you prefer for such a product?

Interviewee 8: I might prefer a sweet and creamy flavor.

Interviewer: Now, there are insect food products available in the Chinese market, such as fried crickets and silkworm pupae, and many young people have accepted them. However, there are currently no insect snacks on the market. Are you looking forward to insect snacks being introduced to the market?

Interviewee 8: I'm generally not very eager for insect snacks. I'd prefer to see new snack products without insects. I might consider eating insect-based snacks only if there were no other options.

Interviewer: If you have any questions or concerns, you can always reach out to me at yizhi.yao@wur.nl. The interview ends here. Thank you for your time.

Interviewee 8: No, I don't have any more questions.

Interviewer: Alright, that concludes this interview. Thank you for your participation.

Interviewee 9

Interviewer: First of all, thank you for taking the time to participate in this interview. My name is Yizhi. This interview is part of my graduate thesis and will take approximately 15 minutes. Before we begin, I would like to inform you that you have already agreed to participate in this interview, and the interview will be recorded for experimental research analysis and data transcription. Your privacy and anonymity will be protected.

Interviewer: I would like to clarify the terms of the interview before we begin. All the foods mentioned in the interview are human snacks made from edible insects, including insect cookies, insect granola bars, insect potato chips, and so on. You can take a look at the first image I sent you, which shows some of the insect-made snacks, such as insect energy bars, insect cookies, and insect potato chips.

Interviewer: The purpose of this experiment is to gain a deeper understanding of how young Chinese consumers perceive insect snacks and the factors that influence their acceptance. The interview will be divided into five parts, and all questions are open-ended with no right or wrong answers, so feel free to respond as you wish.

Interviewer: I'll start with some general questions. First, how old are you?

Interviewee 9: 23.

Interviewer: 23. Okay, what is your level of education?

Interviewee 9: I'm currently a college senior.

Interviewer: Alright, which ethnic group do you belong to? How many people are there in your family?

Interviewee 9: I'm Han Chinese, and currently, there are three people in my family, including my parents and me.

Interviewer: Okay, where did you grow up, and where do you currently live?

Interviewee 9: Both in Shanghai.

Interviewer: Alright, have you ever tried insect snacks before?

Interviewee 9: No, I haven't.

Interviewer: So, have you ever tried insect-based food?

Interviewee 9: No, not that either.

Interviewer: Then, is there any specific reason that has prevented you from trying them?

Interviewee 9: The main reason is that I have a bit of resistance to the idea of eating insects. Whether it's snacks made from insects or the insects themselves, as soon as I hear that the raw material is insects or it looks like insects, I feel a bit resistant.

Interviewer: Hmm, I see. So, is this feeling more about fear or disgust?

Interviewee 9: I can't really say, but it's more of a strong aversion. I would definitely feel disgusted when it comes to insects.

Interviewer: Alright, I understand. So, do you think there's any difference between insect snacks and insect-based food?

Interviewee 9: There are some differences. Food might have a broader range, and snacks might be included in the category of food. For example, cookies are a type of food, but they can also be a snack. However, rice is not a snack; it's considered a food.

Interviewer: Okay, so food is like a larger category, and snacks are a subcategory under it, right?

Interviewee 9: Yes.

Interviewer: Alright, now I'd like to ask you about your feelings regarding insect snacks. First, let's talk about the visual experience. When you think about the appearance of insect snacks, what colors, shapes, and sizes do you imagine?

Interviewee 9: If it's made from insects, I think it would look quite similar to regular snacks in terms of appearance, but the color would be a bit darker. For example, if a snack is brown in color, then I imagine that insect snacks would be closer to a darker shade of brown.

Interviewer: Hmm, alright. How do you think they would look in terms of shape?

Interviewee 9: It should be more similar to cookies, and the size would be similar to biscuits.

Interviewer: Okay, and what kind of thoughts do these visual experiences bring to you? Do you find them disgusting, or do you think they are not much different from regular snacks?

Interviewee 9: Well, it depends on the context. If you just give me two pieces of cookies that look the same, I might eat them quickly because I like snacks. But if you inform me in advance that one of these cookies is made from insects, no matter how it looks, I would choose the other regular cookie. If one is made from insects, I probably wouldn't touch it.

Interviewer: Understood. So, it's more about the type of insect rather than the visual experience. If you have an aversion to insects, you wouldn't want to try them no matter how they look, right?

Interviewee 9: That's correct, but it also depends on the species of the insect. I might be fine with crickets, for example, but I would absolutely not try things like caterpillars or silkworm pupae, no matter what they look like.

Interviewer: Alright, next, I'd like to show you a set of pictures of various insect snacks available in the market. After looking at these four images, what are your visual impressions and opinions?

Interviewee 9: Actually, it's pretty much as I imagined. They look like cookies or cereal bars, and you can't see the insects themselves. This makes them more acceptable to me.

Interviewer: Okay, let's talk about the taste experience now. When you think about insect snacks, what flavors and textures come to mind? For example, sweet, sour, bitter, spicy, salty, soft, chewy, crunchy, etc.

Interviewee 9: It's hard to say, but I think they would be on the salty side and have a softer, chewier texture. I can't really imagine a crunchy texture.

Interviewer: Alright, and what kind of thoughts do these salty, soft, and chewy sensations bring to you?

Interviewee 9: It might feel a bit strange. If I had to eat a cookie made from insects, I might do it, but I would still feel like I'm eating insects, which could be a bit gross. If it's soft or in the form of a cookie, it's more tolerable, but if it's crunchy, I would associate it with the exoskeleton and legs of insects and feel disgusted.

Interviewer: Hmm, I see. So, you would be more accepting of flavors and textures that resemble regular snacks, but the fact that they are made from insects might still be off-putting, especially when it comes to purely insect-based snacks like fried insects.

Interviewee 9: Yes, that's correct.

Interviewer: Alright, let's talk about the sense of smell now. Can you describe the scents you imagine when eating insect snacks? For example, the sound it makes when the food enters your mouth?

Interviewee 9: The scent would probably have a slight hint of the original insect odor, with a grassy or earthy aroma. However, I would expect the processed flavors and seasonings to be more dominant. For instance, if it's a savory flavor, it might have a hint of onion or similar aromas.

Interviewer: Okay, are these insect food scents something you would accept and enjoy?

Interviewee 9: I think if a snack has a distinct natural aroma that makes me wonder about the exact ingredients or the type of insects used, it might make me hesitant to try it. Even if it's a slightly unusual scent, I might associate it with the insect it was made from and find it disgusting. If it's soft, cookie-like, and has been processed, it might be more acceptable, but if it's crunchy, I would start visualizing the appearance of the insect and find it very unpleasant.

Interviewer: Alright, so you would be more willing to try flavors and textures similar to regular snacks, but because they are made from insects, you might still have some reservations, unless they have been processed and flavored to your liking.

Interviewee 9: That's correct.

Interviewer: Understood. Now, which of the sensory experiences you mentioned, including visual, taste, smell, and sound, do you find most important when choosing insect snacks?

Interviewee 9: In terms of sensory experiences, I believe visual perception is the most crucial. If I see the appearance of insects, I would find it very repulsive and unappetizing, and I would consider the taste and aroma after that.

Interviewer: Alright, thank you for sharing that. Besides the sensory attributes you mentioned, what other factors would you consider when purchasing insect snacks?

Interviewee 9: I would look at the ingredients, particularly which type of insects were used. For example, I can't accept silkworm pupae. If a snack doesn't mention it's made from silkworm pupae and has a crispy texture, I might eat it, but if you inform me that it's primarily made from silkworm pupae, I might not be willing to try it, as I have a strong aversion to them. This aversion stems from my school days when I had to dissect silkworm pupae, and the experience of cutting them open and their innards spilling out left a lasting negative impression on me. So, if you tell me that a snack is made from a species of insect that I have an aversion to, I might not want to try it even if it looks like a regular snack.

Interviewer: I see, so the species of the insect matters a lot to you.

Interviewee 9: Exactly.

Interviewer: Are there any other product attributes that would influence your choice when purchasing insect food? For example, safety, brand, health, etc.

Interviewee 9: I usually assume that it's safe, so I don't think too much about it. The reason is that if a product is not safe, it won’t pass food safety tests and won't be allowed to be sold on the market. If there are safety issues, the product shouldn't be on the market. However, this can vary. If I get sick from eating a snack, I would definitely report the side effects. If the side effects are specific to a small group of people, it doesn't constitute a safety issue. As long as it's safe for the majority, the product can continue to be sold. But if a product causes the same symptoms in the majority of people, with varying degrees of severity, I consider it a safety issue, and it shouldn't be on the market.

Interviewee 9: As for health concerns, it's important to me. When I shop for food, I pay attention to factors like fat content, calories, and sugar content. For instance, I look at how much protein, fat, and energy a product contains per 100 grams. I've gained some weight recently, so I try to choose healthier options when buying snacks, even if they might not taste as good.

Interviewer: Alright. Does the brand of the product itself have an impact on your choice?

Interviewee 9: The brand itself doesn't matter much to me when I buy food. For example, if there are two brands like "Brand A" and "Brand B," I don't pay much attention to which one is which. If one is bigger than the other, I might choose the larger brand, but it doesn't affect my decision significantly.

Interviewer: Okay. How about advertising effects? Do advertisements or specific marketing messages influence your decision to try a product?

Interviewee 9: I think advertising does have an impact on me. For example, if I haven't heard of a particular snack before but see an advertisement that portrays it as delicious and low in

calories, and it matches my preferences, I might try it the next time I go to the supermarket. If I find it to be good after trying it, I might continue to buy it or replace my usual snacks with it.

Interviewer: Alright, now I'd like to show you some pictures, the ones I sent you earlier. In the second image, there are three photos, right? It's cookies made with cricket flour, and the taste and appearance are similar to regular cookies. Would you eat it?

Interviewee 9: I might. Why do I say that? I don't have an aversion to crickets. So, I would give it a try, and if it tastes good, I might eat it occasionally. But, you know, I wouldn't include it in my regular snack list. I feel like I'm just curious to try it a little bit.

Interviewer: I see. Now, let's say you are in Walmart, and you see option B on the shelf with those three snacks. If you see those three snacks, which one would you lean toward buying?

Interviewee 9: I would tend to choose the third one.

Interviewer: Alright, what's your reason for that?

Interviewee 9: It still comes down to the packaging. As I mentioned earlier, I pay attention to the packaging. Looking at these three packaging styles, the third one is the least likely to make me realize that it's made from insects, and it doesn't show the appearance of the insects. But for the first and second options, they clearly display the appearance of the insects, which, to some extent, would greatly influence my perception of the product. For example, when it's explicitly mentioned that the product is made from these three kinds of insects, the second one being the primary ingredient, I wouldn't find it very appealing. I would expect it to taste less good. So, I might choose the third product because it's less apparent in terms of its appearance.

Interviewer: Got it. If you knew that the first two products, which you weren't inclined to pick, were more environmentally friendly, for example, they use fewer water and land resources, and eating them has a smaller environmental impact, whereas the third one had a comparatively larger environmental impact, would you still choose the third one, or would you consider switching to the first two?

Interviewee 9: I might still lean toward choosing the third one. Even though I understand that the first two are likely to have a smaller environmental impact, I would still choose the third one. As I mentioned earlier, the packaging significantly matters to me. If I find the packaging unappealing, it might even make me feel nauseous. So, even if I know the first two options are environmentally friendly, I wouldn't find the packaging attractive, and it might lower my mood. I might still go for the third one because I could at least tolerate the packaging, even though it might have a comparatively larger environmental impact. So, overall, even if it's better for the environment, if it's visually unattractive to me, I'd go for the third option. When I look at the package and immediately see that the cookies inside are made from certain insects, and if I find those insects disgusting, why would I choose something that makes me repulsed for the sake of the environment? When I buy something, it's for my own enjoyment, and if seeing the package lowers my mood, then I'd rather buy something less eco-friendly but at least tolerable in terms of packaging. I might still eat it.

Interviewee 9: So, in summary, even if it's environmentally friendly, I'd still go for the third option if I find the packaging visually unappealing, even if it has a larger environmental impact. In other words, the environment matters to me, but the packaging matters more.

Interviewer: Alright, thank you for explaining. Besides the factors you've mentioned, such as taste, health, safety, packaging, and environmental impact, are there any other factors that would influence your choice when purchasing insect snacks?

Interviewee 9: I typically assume that insect snacks are safe, so I don't think much about safety. I believe that if a product is unsafe, it won't pass food safety tests and won't be allowed to be sold in the market. If there are safety issues, the product shouldn't be on the market. However, this can vary. If I experience negative side effects after consuming a snack, I would definitely report those side effects. If the side effects are specific to a small group of people, it doesn't necessarily indicate a safety issue. As long as the product is safe for the majority of consumers, it can continue to be sold. So, safety concerns are not a significant factor for me.

Interviewee 9: In terms of health, it's essential to me. When I shop for food, I pay attention to factors like fat content, calories, and sugar content. For instance, I check how much protein, fat, and energy a product contains per 100 grams. I've gained some weight recently, so I try to choose healthier options when buying snacks, even if they might not taste as good. Health is an important consideration.

Interviewer: How about the brand of the product itself? Does the brand have any impact on your choice?

Interviewee 9: The brand itself doesn't matter much to me when buying food. For example, if there are two brands, "Brand A" and "Brand B," I don't pay much attention to which one is which. If one is a more prominent or well-known brand, I might choose the larger brand, but it doesn't significantly affect my decision.

Interviewer: Alright. Does advertising or specific marketing messages influence your decision to try a product?

Interviewee 9: I think advertising does have an impact on me. For example, if I haven't heard of a particular snack before but see an advertisement that portrays it as delicious and low in calories, and it matches my preferences, I might try it the next time I go to the supermarket. If I find it to be good after trying it, I might continue to buy it or replace my usual snacks with it. So, advertising can influence my choices.

Interviewer: Alright. If you could create your own insect snack, what flavor, ingredients, texture, and packaging would you prefer?

Interviewee 9: I might lean toward making it savory, like with a scallion flavor. As for the appearance, I might prefer something like sandwich cookies, with a creamy filling. I'd also consider various styles, not limiting myself to just one. I might create different styles for the same product or one product with different shapes. I'd lean toward variety.

Interviewee 9: As for packaging, I wouldn't specifically indicate the main ingredient's insect representation on the packaging. I would include information about the primary ingredients in

the ingredient list but not draw the insect's appearance on the packaging. For instance, if our product was made from cockroaches or silkworm pupae, which I feel most young people wouldn't accept, I wouldn't label it on the packaging but only list it in the ingredient list.

Interviewer: Understood. In the Chinese market, there are already insect-based foods like fried crickets and silkworm pupae, and many young people have accepted them. However, there aren't insect-based snacks on the market yet. Are you looking forward to the market introducing insect-based snacks?

Interviewee 9: I still have some aversion to insects, so I'm not really looking forward to insect-based snacks.

Interviewee 9: I can't predict whether insect-based foods will be widely accepted by a large consumer group. Currently, alternative food products that use soybeans are prevalent in the market. Products made from soybeans, such as plant-based meats, are more widely accepted. So, if you suddenly introduce insect-based products to replace meat, I think it won't be easy. Firstly, insects are not something everyone can accept. In China, for instance, there are very few places where people eat insects, mainly in Guangdong and Yunnan. If you want to introduce insect-based products, they might be accepted more readily in Yunnan, Guangdong, and Fujian. But if you want to expand beyond these areas to the entire country, it might take a long time. Also, from a long-term perspective, what do we mean by long-term? Is it 10 years, 5 years, or 1 year? In the short term, it doesn't seem feasible. The short term is unlikely to see widespread acceptance, at least from my perspective. Even after three years, I might still not be accepting of it. Why do I say this? Let me give you a specific example. I once saw vending machines that sold insect-based beverages and cookies. I spent three years in that area, and my feelings and rejection of those products didn't change. So, for me, in the short term, I might still not be accepting. If you want to break out of these regions and appeal to a broader audience, it might take a very long time.

Interviewee 9: To be clear, the probability of widespread acceptance is quite low in the short term, say, 3 to 5 years. Perhaps, in the long term, like 20 to 50 years, the probability of acceptance could increase significantly. It's certain that it will take a long time.

Interviewer: Indeed. Well, it's quite challenging to change people's perceptions in the short term.

Interviewee 9: Yes, it mainly depends on people's levels of acceptance. Many people haven't even tried it or have seen something they want to avoid. If they never try it, it's likely they'll never accept it.

Interviewer: Alright, thank you for your insights. Is there anything else you'd like to ask before we conclude?

Interviewee 9: No, I'm good.

Interviewer: Great. This concludes the interview. Thank you for your time, and if you need this transcript for your paper, feel free to contact me at yizhi.yao@wur.nl. The interview ends here, and thank you for your participation.

Interviewee 10

Interviewer: Thank you for taking the time for this interview. This interview is part of my graduate research and should take about 15 minutes. Before we begin, I want to inform you that you have agreed to participate in this interview and have consented to the recording of the interview. The recording will be used for research data analysis and interview transcription, and your privacy and anonymity will be protected.

Interviewer: Before we start, I'll clarify some terms. The food mentioned in this interview is all human snacks made from insect ingredients, including insect cookies, insect oat bars, insect potato chips, and so on.

Interviewer: The purpose of this interview is to understand how young Chinese consumers feel about insect snacks and the factors influencing their acceptance. The interview will be divided into five parts, and all questions are open-ended, with no right or wrong answers. So, you can share whatever comes to your mind.

Interviewee 10: Okay.

Interviewer: Let's officially begin the interview. First, may I ask how old you are?

Interviewee 10: I'm 26 this year.

Interviewer: Okay, what is your educational background?

Interviewee 10: I'm currently pursuing my postgraduate studies.

Interviewer: Alright, and what is your ethnicity?

Interviewee 10: I'm Han Chinese.

Interviewer: Han Chinese, right? Okay, and where did you grow up?

Interviewee 10: I grew up in Jiangmen, Guangdong.

Interviewer: Alright, how many people are in your family?

Interviewee 10: There are four of us.

Interviewer: Okay, have you ever tried insect snacks before?

Interviewee 10: I haven't tried those insect cookies and such, but I've had some insect food.

Interviewer: I see. Can you share your experience with insect food?

Interviewee 10: It's been a long time, and I don't remember the taste very well. It looked like street food, deep-fried and crispy.

Interviewer: I see. How do you think insect snacks differ from insect food?

Interviewee 10: I feel that insect snacks are more like the kind of packaged cookies you find on shelves. They come in packaging, and they don't look much like insects themselves. They are closer to the potato chips or cookies we eat. But when it comes to insect food, I think it's more like a dish or a snack. For example, in our local area, we have fried silkworm pupae, which we eat as a dish or as a snack with drinks.

Interviewer: I understand. Now, let's move on to the second part. We'll start by discussing the visual experience. When you think of insect snacks, what do you imagine? Can you describe their appearance, size, color, and so on?

Interviewee 10: Insect food looks similar to specimens.

Interviewer: Specimens?

Interviewee 10: Yes, they have a similar appearance, like insect specimens.

Interviewer: Alright, so you mean they have a shape and color that closely resemble actual insects?

Interviewee 10: Yes.

Interviewer: Okay, what kind of feelings do these visual experiences evoke for you? Do you find them disgusting or intriguing?

Interviewee 10: I find them a bit disgusting. When I think of the appearance of insects, I feel like they're dirty and not clean. So, I can't really accept how they look. If you were to ask me to try them now, I might not be very willing.

Interviewer: Alright, next, I'd like to show you some pictures of insect snacks that are already available in the market. After looking at these pictures, what are your visual experiences and thoughts?

Interviewee 10: The pictures you showed me don't look much different from regular snacks. They seem to resemble common snacks you'd find in a supermarket. With this kind of packaging and product appearance, I might not find them as disgusting or dirty, so I might be less repelled by them.

Interviewer: Alright, now let's move on to the gustatory experience. When you think of insect snacks, what flavors, textures, and thoughts come to mind?

Interviewee 10: They're either crispy or soft.

Interviewer: What about the taste? Is it sweet, sour, bitter, spicy, or salty?

Interviewee 10: I've had both sour and sweet-spicy flavors.

Interviewer: I see. Do you know how they are specifically prepared? Is it the choice of seasonings or the taste of the insects themselves?

Interviewee 10: It's the taste of the seasonings. The vendors take the fried insects, put them in a bowl, and add the selected seasonings. For example, I like sweet and spicy, so I chose sugar, chili, and a bit of vinegar. The vendors mix it all together for you.

Interviewer: I see. What do these flavors bring to your senses? Is it a good taste experience?

Interviewee 10: The taste is good, but visually, I don't find it very appealing.

Interviewer: So, you find the taste delicious, but you still have some aversion to eating them due to the appearance of the insects, is that right?

Interviewee 10: Yes. If they didn't look as intimidating, like if you couldn't tell they were insects, but they tasted great, then I would accept them.

Interviewer: Alright, for insect snacks, what kind of texture and taste do you think is better?

Interviewee 10: As I mentioned earlier, I prefer sweet and spicy flavors. In terms of texture, I like the crispy kind, but I find it gross if it's too crunchy and bursting with juices.

Interviewer: I see. Now, let's talk about the olfactory experience. When you think of insect snacks, can you describe their smell?

Interviewee 10: As for the smell, it's mostly the aroma of the seasonings. For instance, if I added chili, it would smell spicy.

Interviewer: Do you accept and like the olfactory experience of these insect snacks, or would you prefer them to have different scents?

Interviewee 10: I like the seasoning's smell, kind of like barbecue. I feel it's more acceptable than the smell of the insects themselves.

Interviewer: Well, among the senses we've discussed - visual, taste, smell, and hearing - which one is the most important to you when choosing insect snacks?

Interviewee 10: I think it's the visual aspect. I'm a visual person, and if a product looks disgusting or dirty, I won't buy it, even if it tastes good. If a product has attractive packaging and an appearance I can accept, I might buy it to try. If the taste is good, I'll continue to purchase.

Interviewer: So, the visual aspect determines whether you'll accept the product?

Interviewee 10: Yes.

Interviewer: Okay, let's move on to the next part. Apart from the sensory attributes we've discussed, what other factors do you consider when buying insect snacks?

Interviewee 10: As I mentioned, I look at the packaging and whether the product meets my standards before deciding whether to buy it.

Interviewer: Alright, could you elaborate on those standards that measure the packaging and product's quality?

Interviewee 10: For example, as far as I know, most insects contain a lot of harmful substances, and they are very dirty. You don't know if they've been processed or raised artificially, which makes their safety a concern. So, before buying, I would hesitate to know if they are safe.

Interviewee 10: As for the product's quality, I usually check its popularity. If a snack is commonly found in supermarkets, I feel it's safer. Because if it can be stocked on a large scale in a supermarket, it indirectly indicates that it has passed safety tests, and many people buying it means it's safe to consume. I'm less concerned about safety issues in such cases.

Interviewer: I understand. So, besides packaging aesthetics, safety is also an important factor.

Interviewee 10: Yes, I believe food safety is quite important, especially when it comes to insect food. But I don't have the time to research specific additives or checks. My main concern is whether the snack is widespread.

Interviewee 10: Okay, what about other factors like health, advertising, branding, or environmental concerns?

Interviewer: I don't pay much attention to health, not because I don't care about it, but because I'm not looking to insect food for health purposes. I think I can get my vitamins from fruits, which seem safer. As for high protein, I'd choose to eat meat unless I have no other option, in which case I might consider insects.

Interviewer: So, do you usually pay attention to the ingredient list when buying food?

Interviewee 10: I look at the calories. I don't pay much attention to the other details.

Interviewer: If the calorie count is very high, would you avoid buying it?

Interviewee 10: I just take a glance at it to get an idea, but I don't pay too much attention to whether it's high or low.

Interviewer: Okay, are there any other factors like advertising, branding, or environmental concerns that influence your purchasing decisions?

Interviewee 10: Advertising doesn't have a significant impact on my choices because it merely provides a reference. Branding is also not a big deal for me when it comes to food. I rarely remember the brands of what I eat.

Interviewer: I see. In the next part, we'll present you with three images. In these images, there are three different snacks made with cricket flour. They have a similar texture to regular cookies. What do you think of them? Would you be willing to try them?

Interviewee 10: They look quite alright.

Interviewer: Would you be willing to try them?

Interviewee 10: Yes, I would try them, and if they taste good, I would continue eating them.

Interviewer: Great. Now, if you were in a supermarket and had to choose among the following three snacks, which one would you pick?

Interviewee 10: I would prefer the third one. The first two look like insect repellent, and they have insect images on them, which I find unappealing and unsanitary.

Interviewer: But if you knew that the first two were more environmentally friendly, using less water and land resources, and if eating them would benefit the environment, would you still choose the third one, or would you lean towards the first two?

Interviewee 10: I would still choose the third one. The environment doesn't concern me much.

Interviewer: Could you explain why?

Interviewer: So, what you see in advertisements on TV or celebrity endorsements doesn’t affect your choices?

Interviewee 10: Not really, and the same goes for branding. I don't pay much attention to the brand when it comes to food.

Interviewer: Alright, we have concluded the discussion. Thank you for your participation. Your insights are valuable for my research project, and I will transcribe this interview. If you'd like a copy of the final interview text and research paper, feel free to contact me anytime at yizhi.yao@wur.nl.

Interviewee 11

Interviewer: Thank you for taking the time to participate in this interview. This interview is part of my graduate research and will take approximately 15 minutes. Before we begin, I want to inform you that you have agreed to participate in this interview and have consented to the recording of the interview. This recording will only be used for research data analysis and interview transcription, and your privacy and anonymity will be protected.

Interviewer: Before we start, I would like to clarify some terms. In this interview, all references to food are human snacks made from insects, such as insect cookies, insect granola bars, and insect potato chips. Now, I will show you some pictures of snacks made from insects. You can take a look at the image I sent you, such as the top left one, which is an energy bar made from insects, insect cookies, insect potato chips, and so on.

Interviewer: The purpose of this interview is to understand the feelings of young Chinese consumers towards insect snacks and the factors influencing their acceptance. The interview will be divided into five parts, and all questions are open-ended, with no right or wrong answers. Feel free to share your thoughts.

Interviewee 11: Alright.

Interviewer: Now, I will officially begin the interview. First, may I ask how old you are?

Interviewee 11: I'm 25 this year.

Interviewer: Okay, what is your educational background?

Interviewee 11: I'm currently a graduate student.

Interviewer: Alright, and which ethnic group do you belong to?

Interviewee 11: I'm Han Chinese.

Interviewer: Han Chinese, I see. Where did you grow up?

Interviewee 11: I grew up in Shenzhen, Guangdong.

Interviewer: How many people are there in your family?

Interviewee 11: Two people.

Interviewer: Have you tried insect snacks before?

Interviewee 11: Does trying fried silkworm pupae count?

Interviewer: Yes, can you share your experience with me?

Interviewee 11: When I was traveling with my friends in Yunnan, we tried some local specialties, including fried silkworm pupae. It looked a bit scary at first, but after trying it, I found it to be okay.

Interviewer: Alright, do you think there's a difference between insect snacks and insect food products?

Interviewee 11: For me, there might not be much difference because I consider fried silkworm pupae and roasted bee larvae as snacks. However, I know that some minority groups may buy insects specifically to use in cooking, so they might lean more toward food rather than snacks.

Interviewer: Alright, let's talk about the visual experience. When you think of insect snacks, such as insect potato chips or insect cookies, what do you imagine in terms of their appearance, color, and size?

Interviewee 11: The size is around 5 centimeters or so. Are the insects directly placed on the snacks, like on potato chips, or are they integrated into the food?

Interviewer: They can be any way you imagine.

Interviewee 11: It could be in powdered form, sprinkled on top, which might make it more palatable.

Interviewer: What about the color?

Interviewee 11: The color could be black or yellow, primarily depending on the natural color of the insects.

Interviewer: Alright, now I'll show you various insect snacks available in the market. They look like this. There are insect granola bars, insect cookies, and insect potato chips. When you see these images, do you have any visual experiences or thoughts that differ from what you previously mentioned?

Interviewee 11: It looks similar to regular snacks that are sold.

Interviewer: I see.

Interviewee 11: Yeah, I don't feel particularly uncomfortable or disgusted by them. I think they look fine, at least something I can accept.

Interviewer: Alright, let's now explore the taste experience of insect snacks. When you think of insect snacks, what flavors and textures come to mind?

Interviewee 11: I imagine them to be crispy and somewhat savory. The flavor should be a bit savory, not too strange or with any unusual tastes.

Interviewer: Would you prefer them to be more salty or sweet?

Interviewee 11: I'd prefer them to be on the salty side. It's hard for me to imagine them being sweet.

Interviewer: Salty, right? Alright, let's discuss the olfactory experience. When you think of insect snacks, can you describe the aroma they might have?

Interviewee 11: For the aroma, it's best not to have any distinctive smell, just like regular snacks. For example, granola bars should have the aroma of granola, and potato chips should have a salty or spicy aroma.

Interviewer: So, no strong odors, right?

Interviewee 11: That's right, no distinctive smells.

Interviewer: Okay, great. So, for example, no earthy or unusual odors.

Interviewee 11: Yes, the earthy taste would make me think of the way insects move, and I find it quite disgusting.

Interviewer: Alright, of all the sensory experiences we discussed, such as visual, taste, and smell, which one do you consider the most important when choosing insect food products?

Interviewee 11: Taste.

Interviewer: Why is that?

Interviewee 11: Because it mainly depends on being delicious. I will only buy it if I want to eat it. If it's something else, not a snack, I might not pay as much attention to the taste.

Interviewer: Okay, then, I'd like to explore some product attributes that might affect your acceptance of insect snacks, aside from how they look, taste, and smell. Are there other factors you consider when purchasing insect snacks? Like the price or other aspects?

Interviewee 11: Basically, it's the price and palatability. I don't pay much attention to other factors.

Interviewer: So, things like safety, packaging, or environmental friendliness aren't significant factors for you, right?

Interviewee 11: That's right, I don't pay much attention to those factors. They are rarely mentioned in advertisements for snacks like potato chips or cookies.

Interviewer: I see. Now, I'd like to show you a set of images. These are thin crispy biscuits made from cricket flour, and they have a similar taste and appearance to regular biscuits, like salted ones. What are your thoughts on these? Would you consider trying them?

Interviewee 11: I might give them a try.

Interviewer: What factors make you feel like you'd be willing to try them?

Interviewee 11: I'm not particularly averse to this kind of insect food to begin with. So, if they taste good, I'd be willing to try.

Interviewer: Alright, if you were at Walmart, and you saw these three snacks on the shelf, which one would you be more inclined to choose?

Interviewee 11: The third one.

Interviewer: Alright, and what's the reason for your choice?

Interviewee 11: The reason is that there are no large images of insects on the packaging.

Interviewer: Okay, now, if you knew that the two options you didn't choose were more environmentally friendly, for example, they were better for the environment and used less water, would you still stick with your choice of the third option, or would you reconsider the other two?

Interviewee 11: Usually, I would still choose the third one.

Interviewer: What's the reason for that?

Interviewee 11: I feel that the packaging should be more comfortable for me to look at. The first two look a bit disgusting, and I wouldn't prefer to eat them.

Interviewer: Okay, then, let's move on to ranking the importance of these product attributes we discussed earlier, such as taste, appearance, smell, price, and other factors. Can you rank them from most important to least important in your opinion?

Interviewee 11: Taste comes first.

Interviewer: Alright, are there any other factors?

Interviewee 11: Taste includes various sensory aspects, right?

Interviewer: Yes, it includes visual, smell, and taste, among others. There are also other product attributes, like price and packaging, to consider.

Interviewee 11: Okay, so the first is taste, the second is price, the third is packaging, and the fourth is environmental-friendliness.

Interviewer: Okay. Health isn't a significant factor, is it?

Interviewee 11: Generally, I don't pay much attention to health when it comes to snacks.

Interviewer: Alright, if you could create your own insect snack, what flavor, ingredients, texture, and packaging would you choose if you had the opportunity to make it yourself?

Interviewee 11: How would I make it? Well, I'd deep-fry it, and I'd sprinkle the ingredients on the snack.

Interviewer: So, you wouldn't want the natural shape of the insects to be visible, right?

Interviewee 11: That's correct.

Interviewer: And would it be more on the salty side or the sweet side?

Interviewee 11: It would be on the salty side. It's hard for me to imagine a sweet flavor.

Interviewer: Alright, how about the packaging? If you were to sell it, how would you package it, and what would you put on the packaging?

Interviewee 11: For the packaging, the main thing is not to have prominent images of insects. It should look as good and colorful as possible.

Interviewer: Okay. Because there are insect food products available in the Chinese market, like fried crickets and roasted silkworm pupae. Many young people accept them. However, there aren't insect snacks available in the Chinese market yet. Do you hope that the Chinese market will introduce insect snacks in the future?

Interviewee 11: Yes, I think it's worth trying. Not everyone necessarily limits themselves to eating certain things. In that case, insect snacks could be worth a try.

Interviewer: It's worth trying. Alright, if you believe that it's necessary to promote insect snacks to young people in China in the future, what do you think needs to be done? Any efforts or strategies?

Interviewee 11: Well, it's quite challenging because everyone has different tastes. Some people simply don't eat insects. So, it has to be a personalized approach. You can focus on advertising, and those who like it will naturally buy it, while those who don't won't touch it.

Interviewer: Right, so some fears can't be overcome, can they?

Interviewee 11: Yes, I think that's the case.

Interviewer: Alright, so marketing mainly relies on advertising. In terms of advertising, which aspect do you think would most encourage consumption?

Interviewee 11: In terms of advertising? Well, it was mentioned earlier that eating insects is high in protein, right? So, it might be about nutrition.

Interviewer: From a nutritional perspective, right? Alright, and primarily, it's about nutrition with slightly less emphasis on environmental friendliness, correct?

Interviewee 11: Yes.

Interviewer: Alright, well, that concludes this interview. Thank you for your participation. Do you have any other questions before we finish? None. Alright, thank you for your time and insights. My project greatly appreciates it. If you'd like the final interview transcript, you can contact me anytime at my email, which is yizhi.yao@wur.nl. Thank you.

Interviewee 12

Interviewer: Thank you for taking the time to participate in this interview. My name is Yizhi, and this interview is part of my graduate thesis, which will take about 15 minutes. Before we begin, I want to confirm that you have agreed to participate in this interview. I would also like to clarify some of the terms mentioned during the interview. All the foods discussed in this interview are human snacks made from edible insects, including insect biscuits, insect oat bars, insect potato chips, and so on.

Interviewer: The purpose of this interview is to gain a deeper understanding of the feelings of young Chinese consumers regarding insect snacks and the factors that influence their acceptance. The interview is divided into five sections, and all questions are open-ended, so feel free to respond as you wish. Okay, let's get started. First, how old are you?

Interviewee 12: I'm 28 years old.

Interviewer: What is your level of education?

Interviewee 12: I'm currently pursuing my postgraduate degree.

Interviewer: Which ethnic group do you belong to?

Interviewee 12: I'm Han Chinese.

Interviewer: Alright, where did you grow up?

Interviewee 12: I grew up in Zibo, Shandong.

Interviewer: In Shandong, right? Okay, and how many people live in your household, approximately?

Interviewee 12: There are three of us.

Interviewer: Alright. Have you ever tried insect food before?

Interviewee 12: We eat insects directly in our region.

Interviewer: Could you share your experience? What were your feelings when eating them?

Interviewee 12: When eating them, they are crispy, fragrant, and taste like a crispy snack. It's somewhat similar to eating fried potato chips.

Interviewer: So, you don't have an aversion to them?

Interviewee 12: No, I don't.

Interviewer: Alright. Now, let's discuss your sensory experience with insect snacks. When you think of insect snacks, what visual attributes do you imagine, such as their shape, color, and size? Can you describe them?

Interviewee 12: Since they are processed into snacks, they shouldn't look much different from regular snacks. I think there's no need for them to maintain their original appearance, as it might affect people's perception. However, insect snacks in China are relatively uncommon, and most insect food products are more like the street food variety that's deep-fried.

Interviewer: I see. If it were insect snacks, those that don't resemble insects, and are processed to be similar to regular snacks, would be more acceptable to you?

Interviewee 12: Yes, I believe so.

Interviewer: Great. Now, I'd like to show you a set of images of insect snacks available in the market. After seeing these images, what visual experience and impressions do you have about insect snacks?

Interviewee 12: These images look quite acceptable to me, and I don't feel a strong aversion. They seem similar to regular snacks you'd find in a supermarket.

Interviewer: Okay. Now, let's talk about your gustatory experience. When you think of insect snacks, what flavors and textures come to mind? For example, sweet, sour, bitter, spicy, salty, soft, chewy, crunchy, etc.

Interviewee 12: I imagine flavors like salt and pepper and a crispy texture.

Interviewer: So, a slightly salty and crispy texture would be more appealing to you?

Interviewee 12: Yes, that's what I prefer.

Interviewer: Alright. Let's discuss the olfactory experience. What aromas do you associate with insect snacks?

Interviewee 12: I expect them to have a pleasant aroma, similar to roasted or fried snacks, such as potato chips.

Interviewer: Do you find these aromas acceptable and pleasant?

Interviewee 12: Yes, they are acceptable to me.

Interviewer: Among the sensory experiences we've discussed – visual, taste, and smell – which one do you consider the most important when choosing insect snacks?

Interviewee 12: I would say taste is the most important because the initial impression is primarily based on taste when trying a new product for the first time. After the first try, visual appeal becomes less important.

Interviewer: Alright. Now, aside from sensory attributes like taste and visual appeal, are there any other factors you consider when buying insect snacks, such as hygiene, brand, or price?

Interviewee 12: I pay attention to the health aspect, like calorie content and nutritional value. Price is also a significant factor. Safety is something I'm not very concerned about because I've been eating insects since childhood.

Interviewer: Understood. If you had to choose between these three products, which one would you prefer and why?

Interviewee 12: I would choose the third one. The first two give me the impression of insect repellents or pesticides. I find the third one more appealing.

Interviewer: If you knew that the first two products were more environmentally friendly and had a lower environmental impact, would that make you more willing to try them?

Interviewee 12: If that were the case, I would prefer the more environmentally friendly options. I believe environmental protection is a serious issue, and if I can contribute to it through my diet without much effort, it's a good thing.

Interviewer: Alright. Now, let's rank the product attributes in order of importance. Please rank them from most important to least important.

Interviewee 12: Price is the most important, followed by health aspects (calories and nutritional value), packaging, and then environmental friendliness. Other factors like organic or safety come after that.

Interviewer: So, price is your top priority, followed by health, packaging, and environmental friendliness, with other factors being less important.

Interviewee 12: Yes, that's my order of importance.

Interviewer: Great. If you had the opportunity to create your own insect snack, what flavors, ingredients, texture, and packaging would you choose?

Interviewee 12: I would choose the flavor of grasshoppers, which we call "mazha" in Shandong dialect. I'd prefer to deep-fry them, season them with salt and pepper, and make them crispy, similar to French fries. I would market it as high in protein and low in calories, focusing on the natural taste.

Interviewer: So, you would maintain the original appearance of insects.

Interviewee 12: Yes, that's what I'd prefer.

Interviewer: I understand. Given that you mentioned that Shandong has certain preferences, do you think the region's characteristics play a significant role in taste preferences?

Interviewee 12: Yes, regional characteristics do influence taste preferences to a considerable extent. In Shandong, people enjoy drinking and often prefer snacks that go well with alcohol. If there's a snack like crispy, deep-fried insects available in large packaging, they might consider it as an accompaniment to drinking.

Interviewer: Understood, so regional preferences can influence snack choices. Regarding regions where people may not be accustomed to eating insects, like in Beijing, what do you think could be done to make insect snacks more appealing to them, especially in terms of packaging and promotion?

Interviewee 12: For regions where people are not accustomed to eating insects, I would recommend making the packaging more sophisticated to create a better first impression. It's important to make the snacks not resemble insects, both in taste and appearance. Additionally, engaging nutritionists and health experts for promotion can help convey the message that these products are beneficial and won't have any adverse effects on health. Using food influencers or food vloggers to taste and promote the snacks can also help build trust.

Interviewer: So, it's a multi-faceted approach, including packaging, promotion, and changing the product's attributes.

Interviewee 12: Yes, it requires a comprehensive strategy.

Interviewer: Alright, we've covered a lot of ground. Do you have any further questions?

Interviewee 12: No, I don't.

Interviewer: Alright, this interview is now concluded. Thank you for your time and insights. Your input is highly valuable for my project. If you would like a copy of the final interview transcript or thesis, please feel free to contact me at any time.

Interviewee 13

Interviewer: Thank you for taking the time for this interview. My name is Yizhi, and this interview is part of my graduate thesis, and it will take about 15 minutes. Before we begin, I want to confirm that you have agreed to participate in this interview. Also, I'd like to clarify some terms mentioned in the interview. All the food items mentioned in the interview are human snacks made from edible insects, including insect cookies, insect oat bars, insect potato chips, and so on.

Interviewer: The purpose of this interview is to gain an in-depth understanding of the feelings of Chinese young consumers regarding insect snacks and the factors that influence their acceptance. The interview is divided into five parts, and all questions are open-ended, so feel free to respond as you like.

Interviewer: Great, let's start with some general questions. How old are you?

Interviewee 13: I'm 24 years old.

Interviewer: What is your level of education?

Interviewee 13: I have completed my undergraduate degree, and I'm currently a graduate student.

Interviewer: Which ethnic group do you belong to?

Interviewee 13: I belong to the Manchu ethnic group.

Interviewer: Where did you grow up?

Interviewee 13: I grew up in Tonghua City, Jilin.

Interviewer: Alright, next, how many people are there in your family?

Interviewee 13: There are three people in my family.

Interviewer: Great, next question. Have you tried insect snacks before? For example, insect chips, insect cookies, or similar products?

Interviewee 13: I haven't tried snacks explicitly labeled as being made from insects.

Interviewer: Alright. Have you ever tried any kind of insect food, such as fried locusts or similar street food?

Interviewee 13: In Northeast China, we have tried fried silkworm pupa and fried caterpillars. However, I've had them only occasionally.

Interviewer: Can you talk about your experience with them?

Interviewee 13: Are you referring to my experience with these dishes?

Interviewer: Yes, your experience with eating them.

Interviewee 13: Because of the way they are prepared, the outer layer is quite crispy, and they contain a lot of protein. They have a somewhat soft texture and a rich taste. They are often served with tea, so they have a strong aroma. However, for some people, they might still be somewhat outside their comfort zone.

Interviewer: I see, so for you, it's not a matter of being afraid, but you might find it a bit off-putting.

Interviewee 13: I wouldn't say I'm afraid, but it might be a bit unsettling.

Interviewer: Alright.

Interviewee 13: Because you can see the insects in their original form. Normally, when you buy food at the market, it's already processed, right? But these sellers put a bunch of silkworm pupae together, and you can see many pupae wriggling around, which is quite disgusting.

Interviewer: Okay, next question. Do you think there's a difference between insect snacks and insect food?

Interviewee 13: Semantically, it sounds like insect food would include insect snacks, right?

Interviewer: So, it's like a broader category?

Interviewee 13: Yes, it sounds like insect food is a broader category, and insect snacks might be a smaller subcategory, but I'm not sure. For example, regarding food laws or regulations, there might be specific rules about the content, types, and so on.

Interviewer: Alright. Let's move on. This is related to your sensory experience. When you think about insect snacks, what size and appearance come to mind, and what sensations do you associate with them?

Interviewee 13: What I can imagine is that there might be some insect protein in them, but it's just one of the ingredients. I don't think this ingredient would have a significant impact on the overall snack. In other words, it may not differ significantly from other snacks. The protein component has been replaced with insect protein.

Interviewer: Alright. Now, let's talk about the images of various insect snacks available in the market. I've sent you the first image with four items, like insect oat bars, insect cookies, insect potato chips, insect-based snacks, etc. What visual experience do these images bring to you? Is there anything different compared to your previous thoughts?

Interviewee 13: All these images and foods seem a bit dark in color. Is the first one a chocolate flavor? Why is it this color?

Interviewer: Yes, it's a chocolate flavor.

Interviewee 13: Is the one in the upper right corner also a chocolate cookie? Well, why does it look like this?

Interviewer: Yes, that one is also made from chocolate.

Interviewee 13: It might be because it's a chocolate flavor. The ones at the bottom, even though they have dark packaging, give the impression of brighter colors. They appear natural and less processed because of their colors, I think.

Interviewer: Alright. Now, let's discuss your imagined taste experience. When you think about insect snacks, what kind of taste do you imagine?

Interviewee 13: This relates to the previous question. Since insect protein is just one of the ingredients, I think the taste is determined by other factors. I believe it's more of a sensory experience. You need to consider the overall texture of the product and how well the taste is defined. It's more about the characteristics of the ingredients and their integration and not so much about the insect protein.

Interviewer: I see. So, in terms of taste, it might not differ significantly from the products we see in supermarkets. They will try to make it as close to products we are familiar with.

Interviewee 13: If they want to sell it, I don't think they would overly emphasize the features of insects.

Interviewer: Okay. Next question, do you think the insect snacks would have any distinctive smell, or do you think the smell would be ordinary?

Interviewee 13: To be honest, I'm not sure because I haven't been involved in insect protein development. I'm uncertain about whether these products inherently have any unique characteristics. However, even if they have distinctive features, if I were involved in food development, I would try to combine them with familiar flavors and foods. I wouldn't emphasize the insect flavor too much unless it tastes exceptionally good, which I think is unlikely.

Interviewer: Because some of them extract the protein, and some just crush the insects and mix them.

Interviewee 13: Is that compliant?

Interviewer: It's also allowed.

Interviewee 13: Wow, honestly, once you told me that insects were crushed and mixed directly into the product, I found it hard to accept.

Interviewer: I understand. Okay, next, I'd like to know which of the sensory attributes, such as visual, taste, or smell, is most important when choosing insect snacks.

Interviewee 13: I think what you see first, the visual aspect, plays a significant role. It can determine whether I would try the product again or buy it. I think appearance can have a bigger impact. The smell is also important, but the taste is the most crucial.

Interviewer: Understood. Now, I'd like to explore other factors that might influence your choice of insect-based products, apart from the sensory attributes we discussed earlier. What other factors do you consider when buying insect snacks?

Interviewee 13: For example, nutritional attributes. If you replace the protein in this snack or food with insect protein, there must be a reason for it. It could be for sustainability or maybe because it has a higher nutritional value, such as protein or other nutrients. Or some other reasons.

Interviewer: So, you might pay attention to its nutritional value?

Interviewee 13: I might pay attention to the nutritional attributes or the sustainability aspect.

Interviewer: Alright. And because you mentioned nutrition, such as high protein content, why is sustainability or environmental friendliness important to you? Why do you consider this aspect when choosing food?

Interviewee 13: It might be because I didn't hear much about it while I was in China, but after coming to Europe, I realized that the society here places a strong emphasis on environmental protection and sustainability. If a food product behaves similarly to other products but offers better sustainability, I wouldn't be surprised.

Interviewer: Alright, next, you can look at the second image I sent. It shows three images with the same insect ingredient, ground into a fine powder to make thin crispy cookies, and their texture is similar to regular cookies. What are your thoughts on them, and would you consider trying them?

Interviewee 13: Just looking at these cookies, to be honest, I don't have much of a feeling. I'd like to ask about the first image in the upper left corner. What is printed on the right side of the green box? What's the print?

Interviewer: It's an antenna of a small insect.

Interviewee 13: Haha, once you told me it's made from insects, ground into cookies, I found it challenging to buy.

Interviewer: Alright, I understand. Now, you can see the third image with three different snacks. Suppose you are shopping at Walmart, for example, and you see these three snacks on the shelf. You need to choose one of them. Which one would you prefer to select?

Interviewee 13: First, I would definitely rule out the one on the left with an image of the whole insects, and there are several of them.

Interviewer: Haha, alright.

Interviewee 13: The one in the middle may not be very clear in what it is due to its somewhat cartoonish shape, but I think the green color might make it somewhat appealing. Hmm, does the one on the right not have an insect printed on it? Well, I would lean more towards the two on the right, especially the one on the far right.

Interviewer: Alright, so in terms of packaging, do you think the ones without visible insects would be more acceptable to you?

Interviewee 13: Because the direct presence of whole insects is quite impactful.

Interviewer: Alright. Now, let's say you know that the first two products, especially the first one, are very environmentally friendly, more so than the other two. Would you still choose the third one, or would you reconsider and choose the first one?

Interviewee 13: I can accept the second one at most.

Interviewer: So, it means your compromise on environmental friendliness can only go to a certain extent, and it won't override your preferences, right?

Interviewee 13: Exactly. Now, among all the product attributes we've discussed, like sensory attributes, health, environmental factors, packaging, and marketing, can you rank them in order of importance for your purchase decision, from high to low?

Interviewee 13: For snacks like this, insect snacks are a relatively new concept and possibly a new category of snacks. I think, first of all, it needs to make me accept the idea of it. So, before I try it, the visual attributes will play a significant role. Whether it's through advertising or packaging, it needs to make me willing to accept the idea. I think this is largely conveyed through the visual experience and the concept it communicates.

Interviewer: Alright.

Interviewee 13: After that, if it makes me want to try it, I think the nutritional value and taste would be more important. They might affect whether I would consider repurchasing.

Interviewer: So, it's visual first, followed by nutritional value, and then taste. Is that the order?

Interviewee 13: Should taste come before nutritional value?

Interviewer: Alright, taste goes ahead. Good, I've got it. Is it because when you're buying snacks, taste is the primary factor?

Interviewee 13: Because it's a snack, and it's meant to be eaten.

Interviewer: Alright, I understand. So, now, imagine you can create your own favorite insect snack. How would you choose to make it, like what flavors, ingredients, texture, and packaging would you go for?

Interviewee 13: Firstly, in terms of the production method, I would exclude methods like directly crushing whole insects, which seem quite crude to me. This method might make me feel it's not hygienic, and we don't know if there are any other residues inside the insects. Based on my current understanding, I would lean more towards methods that involve extracting the protein. As for texture, I might prefer it to be somewhat smoother. But based on the product images you provided, they all seem quite rough.

Interviewee 13: Regarding flavors, there are many options. I think, along these lines, we could try something like coffee. When I feel it might be necessary to slightly downplay the inherent attributes of insect protein and focus more on making it a product that people would accept and find delicious based on sensory criteria, that's very important.

Interviewer: Understood. Okay, the next question is somewhat related. In China, there are already some insect-based foods like fried silkworm pupae and fried locusts that some young people are willing to accept. However, there are currently no insect snacks on the market. Would you like to see insect snacks introduced to the market in China? Why or why not?

Interviewee 13: Firstly, concerning insect foods, I think what we discussed, the willingness to accept, may not represent the majority in China. There are still strong regional characteristics, and many of these are traditional foods with deep-rooted customs. In terms of insect foods, I believe the focus should be on concepts like sustainability, health, and environmental friendliness. So, in China, it doesn't develop as rapidly as in other places, but if the market is willing to introduce such products, and if they fall within the range of my acceptance, I might consider trying them and supporting them. However, for long-term acceptance, the reasons may be similar to what we discussed earlier. It's a momentary novelty and awareness.
Interviewer: Right, that makes sense.

Interviewee 13: If you want it to continue, it needs steady development. Especially for the one with whole insects crushed.

Interviewer: Haha, okay. Finally, if you think there is a need to promote insect snacks to young people in China, what efforts do you think should be made?

Interviewee 13: Let me think. From a broader perspective, concepts related to sustainability, environmental friendliness, and nutrition should be promoted, and people need to understand them from a health perspective. I think, in countries where the economy has developed to a certain degree, these ideas naturally emerge. However, due to the uneven development in China, this process might not be as fast as in Europe and the US. But if the market is willing to introduce these products, I think the public's acceptance and the development of concepts like sustainability and health are closely related.

Interviewer: Yes, that's true.

Interviewee 13: But if the market is willing to test the waters, and if it falls within my acceptable range, I might consider supporting it and at least try it in the beginning. But whether it can be accepted in the long term will depend on the reasons we discussed earlier. It's a momentary novelty and awareness.

Interviewer: That's true.

Interviewee 13: I am off track here.

Interviewer: Haha, it's alright. Well, that concludes our interview. Do you have any more questions before we finish?

Interviewee 13: No, I don't.

Interviewer: Alright, thank you for your participation. Before we conclude, do you have any other questions? This interview is now finished. Thank you for your time, and your insights are invaluable to my project. I will transcribe this interview, and if you would like a copy of the interview text and the final paper, please feel free to contact me. My email address is yizhi.yao@wur.nl.

Interviewee 14

Interviewer: Thank you for taking the time for this interview. My name is Yizhi, and this interview is part of my graduate thesis, expected to take about 15 minutes. Before we begin, I would like to confirm that you have agreed to participate in this interview. Now, I would like to clarify some terms mentioned during the interview. All the food mentioned in the interview is human snacks made with edible insects, including insect cookies, insect oat bars, insect potato chips, etc.

Interviewee 14: Okay.

Interviewer: The main purpose of this interview is to gain a deeper understanding of the feelings of young Chinese consumers towards insect snacks and some factors influencing their acceptance. The interview is divided into five parts, and all questions are open-ended, so feel free to answer however you like.

Interviewee 14: Sure.

Interviewer: First question, how old are you?

Interviewee 14: 23.

Interviewer: Okay. What is your educational background?

Interviewee 14: I have a bachelor's degree.

Interviewer: Alright. What ethnic group do you belong to?

Interviewee 14: Han Chinese.

Interviewer: Good. Where did you grow up? And where do you currently live?

Interviewee 14: Shanghai, I've always lived in Shanghai. I was born here.

Interviewer: Okay. How many people are there in your family?

Interviewee 14: Three people.

Interviewer: Alright. Have you ever tried insect snacks?

Interviewee 14: I haven't tried insect snacks, but I have eaten live insects in college because I studied aquaculture. I tried those small bugs used as fish feed, like live mealworms. But they were not processed, just live insects.

Interviewer: Okay. So, you have experienced insect consumption in some form, right?

Interviewee 14: Yes, that could be considered a type of food.

Interviewer: Alright. What do you think is the difference between insect snacks and insect food?

Interviewee 14: If it's raw, it's food. Snacks might be more convenient, with formulated and processed recipes.

Interviewer: Okay, let's talk first about the sensory experience of edible insect snacks. When you imagine eating insect snacks, specifically the visual aspect, what comes to your mind? The color, size, etc.?

Interviewee 14: For processed food, it would probably look similar to regular pet food, like yellow or brown. It might lean towards brown.

Interviewer: So, you imagine it to be similar to Oreo cookies?

Interviewee 14: Yes, something like Oreo cookies.

Interviewer: Alright, here are some images of insect snacks that are already available in some foreign markets. You can see energy bars, insect cookies, insect potato chips, and crispy insect crackers. After seeing these images, do you think they differ from your initial thoughts?

Interviewee 14: I think they are entirely different. Without mentioning insects, they just look like ordinary snacks.

Interviewer: So, the acceptance would be high, right?

Interviewee 14: Yes, that's right.

Interviewer: Okay, let's explore the taste experience of edible insects. When you think about insect snacks, what flavor and texture come to mind? Sweet, salty, crispy, hard, soft, chewy, etc.?

Interviewee 14: I would say crispy because I've heard that insects, especially those eaten in the Northeast, have a crispy texture. They are also aromatic, and if you bite into the protein part, it should be soft.

Interviewer: So, you think it would retain some of the insect's characteristics?

Interviewee 14: But I think if it's an insect snack, it would be aromatic. It should already be processed and blended with other ingredients. It's like adding flavor to it.

Interviewer: Okay, which means you've had a sensory experience with insect food, right?

Interviewee 14: Yes, that could be considered a type of food.

Interviewer: Okay, let's move on to the visual aspect. When you think about eating insect snacks, what comes to mind in terms of color, size, and appearance?

Interviewee 14: If it's processed, it would look like typical pet food, such as dog or cat food, mostly yellow or brown. It has a slightly brownish hue.

Interviewer: What about the appearance, like a potato chip, cookie, or something else?

Interviewee 14: Something like an Oreo cookie.

Interviewer: Alright, good. Now, considering these images of existing insect snacks, do you think they align with your initial thoughts?

Interviewee 14: I feel they are completely different. Without mentioning insects, they just look like ordinary snacks.

Interviewer: So, the acceptance would be high, right?

Interviewee 14: Yes, that's right.

Interviewer: Okay, let's move on to the taste experience of edible insects. When you think about insect snacks, what flavor and texture come to mind? Sweet, salty, crispy, hard, soft, chewy, etc.?

Interviewee 14: Crispy, because insects from the Northeast, for example, are described as having a crispy texture. It's also aromatic, and if you bite into the protein part, it should be soft.

Interviewer: Would you say it retains some of the insect's characteristics?

Interviewee 14: Yes, but if it's an insect snack, it would be aromatic. It should already be processed and blended with other ingredients. It's like adding flavor to it.

Interviewer: Okay, that makes sense. Now, let's discuss the olfactory experience. When you think about insect snacks, what kind of aroma comes to mind?

Interviewee 14: A pleasant fragrance, something like cookies with a chocolate-like scent.

Interviewer: Good. Are these aromas something you like and accept?

Interviewee 14: I think it should be acceptable. Whether I like it or not depends on how it's made. If it's made to resemble regular snacks and not look like insects, it should be acceptable. Maybe it just adds a bit more protein.

Interviewer: Okay, now, out of all these sensory experiences—visual, taste, and smell—which one do you think is most important when choosing insect snacks?

Interviewee 14: Visual.

Interviewer: Why is that?

Interviewee 14: Because if it looks unappealing or scary, your natural instinct associates it with the original appearance of insects. It might create a psychological barrier or fear.

Interviewer: I see. Are you personally afraid of insects?

Interviewee 14: A little bit. If they are small or light-colored, it's okay, but dark-colored insects, like cockroaches, I find them scary.

Interviewer: Okay, let's move on to the factors influencing your choice of insect snacks. Besides the sensory experiences, such as how it looks, tastes, and smells, what other factors do you consider when purchasing insect snacks?

Interviewee 14: Firstly, it's about the brand. I feel that big brands provide some assurance. You don't have to worry about whether it's unreliable, whether it will make you sick, or what kind of reactions it might cause. I think big companies won't do that; they protect their brand, so they won't mess around. As for other aspects, I pay attention to advertisements or reviews by real people. Nowadays, there are many reviews on platforms like YouTube or Little Red Book. If there are people trying it out, like regular snacks, I think some people will be willing to try it.

Interviewer: I see, that's important. So, would you categorize this as a type of advertisement?

Interviewee 14: Yes.

Interviewer: Okay. You mentioned brands earlier, and if I understand correctly, is your preference for brands based on concerns about their safety?

Interviewee 14: Yes.

Interviewer: So, you also consider their safety, right?

Interviewee 14: Yes, because when it comes to things like bugs, I always associate them with viruses or bacteria, and it feels unsafe to eat them. It's not like regular food, so safety is crucial.

Interviewer: Okay, next, let's look at a set of pictures. These are cookies made with cricket powder, and they look just like regular cookies. They taste the same too. If you saw them online or at Walmart, would you buy them and eat them?

Interviewee 14: I think if I haven't tried them or seen any advertisements, I wouldn't choose to eat them. There are many types of cookies, so why choose these? Although crickets look cute, rabbits are cute too. Why eat rabbits? Unless someone tells you, "Oh, these are pretty good," or there's something unique about them, then I might consider trying.

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Interviewer: Understandable. If you saw these three snacks on the shelf, you might choose one of them.

Interviewee 14: I would choose the third one. The first two have bugs in them, and they make me uncomfortable and nauseous. Especially the first one, it looks like the original form of an insect. That's not okay; it's definitely not okay. Maybe because I don't eat fried insects, some people might find them tasty.

Interviewer: The reason you find the second one unacceptable is because of the bug drawn on it?

Interviewee 14: Yes, and the way they drew the bug makes it not cute; it's a bit dark.

Interviewer: Oh, I see, a bit scary, right?

Interviewee 14: Yes, if I don't look closely, I might think it's some kind of insecticide.

Interviewer: Okay, if you saw these three products, and you choose the third one. But then you find out that the first two are more environmentally friendly, using less water and being more sustainable, and the prices are the same. Would you reconsider and choose the first two?

Interviewee 14: No, I would still choose the third one. As someone in a state of basic needs, I need to solve my basic needs first. I can accept the third one, but I wouldn't eat the first two. They make me feel nauseous just seeing them.

Interviewer: Understandable, so environmental friendliness is within your acceptable range.

Interviewee 14: Yes.

Interviewer: Okay, for all the attributes we discussed, such as sensory aspects, taste, smell, brand, and safety, how would you rank their importance from high to low?

Interviewee 14: First is the visual aspect; that's probably the most important thing.

Interviewee 14: Then the sense of smell, because it might be packaged, and I can't see it. If I can see it, I think the smell comes second. Then it's the brand, and then advertisements.

Interviewer: Okay, understood. Next question, if you could create your own insect snack, what would it look like, what flavor would it have, how would you make it, and how would you promote it?

Interviewee 14: I would like to use cute-looking insects, like cartoon characters.

Interviewer: Okay, what flavor would you make it?

Interviewee 14: I would prefer it to be similar to others because I'm not someone who enjoys eating insects. Some people like to eat silkworm pupae, thinking it's okay. So, it might look like silkworm pupae. If you go to the northeast or places like Sichuan and Chongqing, there are places where people buy these kinds of insects. They find them normal to eat, but I don't want to see their original form.

Interviewer: Would you make it sweet or savory?

Interviewee 14: As long as I don't see its original form, both sweet and savory are fine.

Interviewer: Right? Okay, how would you promote it in terms of packaging and advertising?

Interviewee 14: Insects are protein, right? If it's made into an energy bar, I think it would make sense. Because it's an energy bar, it's protein-rich, and it doesn't have much taste. It might taste similar to regular energy bars or jerky, or it could have a bit of a different taste. To reduce costs or add some other protein, I think that would be okay.

Interviewer: So, you would emphasize the nutritional aspects?

Interviewee 14: Yes, and I would put some advertising slogans like high protein, low fat.

Interviewer: Okay, because there are already some insect foods in the Chinese market, such as fried crickets and silkworm pupae, and many young people accept them. But there haven't been insect snacks like the ones we discussed. Do you look forward to the market introducing insect snacks?

Interviewee 14: Actually, I'm not very excited about it.

Interviewer: What's the reason?

Interviewee 14: It's because seeing insects still scares me a bit. Also, the fixed impression is that most insects look somewhat scary, like locusts or silkworm pupae. They look ugly.

Interviewer: Okay.

Interviewee 14: But if I saw the cookies you showed earlier or the energy bar, I think I would be willing to try them. If there's a KOL saying it's really good or high in energy, I would be willing to try it, acceptable. Yes, willing to try.

Interviewer: Okay. If you want to popularize insect snacks among Chinese young people, what efforts do you think need to be made? Some people may be afraid, some may find it disgusting. How would you promote it to them?

Interviewee 14: Like I mentioned before, it needs to completely hide the appearance of insects when eating. Also, there might be a need to popularize the idea that these insects are good insects. Moreover, they have high protein content. Then, maybe, for example, if you buy jerky or other energy bars for 20 yuan, these insect products might only cost 15 yuan. For people who are into fitness, what they eat is pretty much the same. Right? If it's a big company or specialized fitness foods, they might give it a try. Maybe they can lower the price to attract people to try.

Interviewee 14: It could involve some trial products, and if it's something like cookies, haha, I think that's fine too. Let some people try it first, as young people are generally willing to try new things. Yes, that's right. If it's because now KOL or KOC, yes, let them do something, promote it and try some tastings. Because actually, looking at the packaging, you don't know it's insects. Yes, after eating it, you might think, "Oh, it's not bad," or something like that.

Some people might find it a bit strange, but some might think, "Hey, this is not much different from others." Yes, but maybe for young people in China, there needs to be some education on health and nutritional knowledge.

Interviewer: More multidimensional.

Interviewee 14: Yes, exactly.

Interviewer: Okay, this interview concludes here. Thank you for your participation. Before we finish, do you have any other questions?

Interviewee 14: I want to know which countries use these snacks?

Interviewer: European Union countries have already approved insect food as a novel food, for example, the Netherlands has established laws specifically for this.

Interviewee 14: Oh, I see. I feel that if you show me these kinds of cookies directly, I think I can try them because they look like regular cookies, and you can't see the insects after frying. Yes, you can give them a try. The packaging doesn't show insects either. But for real insect products, I think it's really not okay, especially those crickets. No, no, no, they are too scary. But for example, corn chips are fine. I think the energy bar is also okay, just slightly dark in color.

Interviewer: Yes.

Interviewee 14: But if it's chocolate-coated, I think it's acceptable. Something like this is okay. But I still wouldn't actively buy it. If there's a tasting, and suddenly someone says, "Hey, this is quite tasty," or something like that, it might have a little influence. You might think, "Oh, I can give it a try."

Interviewee 14: And I think it still needs seasoning. Seasoning it well is crucial. Potato chips with good seasoning are still edible.

Interviewer: Okay, this interview concludes here. Thank you for your time and insights. Your input for my project is very valuable. I will transcribe this interview. If you want the final interview text, you can contact me anytime.

Interviewee 14: Okay, sounds good.

Interviewer: I'll close it now.

Interviewee 14: Alright, goodbye.

Interviewee 15

Interviewer: Alright, thank you for taking the time for this interview. My name is Yizhi, and this interview is part of my graduate thesis, expected to take about 15 minutes. Before we begin, I would like to inform you that you have agreed to participate in this interview. Now, I'd like to clarify some terms mentioned during the interview. All the food referred to in this interview is human snacks made with edible insects, including insect cookies, insect granola bars, insect potato chips, and so on.

Interviewee 15: Okay.

Interviewer: Good. Let's start with the first question. How old are you this year?

Interviewee 15: I am 23 years old.

Interviewer: Alright. What is your educational level?

Interviewee 15: I am a master's graduate student.

Interviewer: Okay. To which ethnic group do you belong?

Interviewee 15: Han Chinese.

Interviewer: Alright. Where did you grow up? And where do you currently live?

Interviewee 15: I grew up in Hangzhou, Zhejiang, and currently, I live in Hong Kong.

Interviewer: Okay. How many people are there in your family?

Interviewee 15: Three people.

Interviewer: Alright. Have you tried insect snacks before?

Interviewee 15: No.

Interviewer: Okay. What do you think is the reason that has prevented you from trying them?

Interviewee 15: Well, one reason is that I haven't seen many of these products in the market, mainly because I haven't come across them. So, I tend to stick to the snacks I usually eat, and insect snacks are not commonly found.

Interviewer: Alright. Have you ever tried insect food before?

Interviewee 15: Actually, I haven't tried insect food either. I have seen some before, but they seem to be quite niche.

Interviewer: Okay. Do you think there is any difference between insect snacks and insect food?

Interviewee 15: I think, based on my literal understanding, insect snacks may seem lighter and more convenient, while insect food may have a broader range of applications, such as in cooking. It could be considered a type of insect food.

Interviewer: I see. Okay, let's move on to your feelings about edible insect snacks. First, let's talk about the visual experience. When you think of insect snacks, what images, colors, or sizes come to mind?

Interviewee 15: If we're talking about insect snacks, I might think that they are made using insects as raw materials or that some components extracted from insects are added to the food. In terms of appearance, it probably won't resemble the shape of insects; I think it would look similar to regular snacks. As for colors, it might be earthy tones like beige or brown.

Interviewer: Earthy tones, right?

Interviewee 15: Yes.

Interviewer: Okay. These are some insect snacks available in the foreign market: insect energy bars, insect cookies, insect cornflakes, and regular insect biscuits. After seeing these pictures, what visual experience do they bring to you? Is there any difference?

Interviewee 15: Well, there's not much difference. They all seem to look similar to regular biscuits at first glance.

Interviewer: Okay, understood. Now, let's discuss the taste and flavor experience. When you think of insect snacks, what flavors and textures come to mind?

Interviewee 15: I think it would be closer to a basic taste, maybe without strong seasoning, but it might have some unique flavors.

Interviewer: Like earthy or barbecue flavors?

Interviewee 15: There might be some barbecue flavor.

Interviewer: Okay. What flavors and textures do you think would be good for insect snacks?

Interviewee 15: Well, I think it would be best to have the aroma of baked goods, which might, to some extent, counteract the stereotypical impression of insects.

Interviewer: Would it be more salty or sweet?

Interviewee 15: I'd say salty, similar to the original flavor of plain cookies.

Interviewer: Alright, understood. Now, let's talk about the olfactory experience. When you think of insect snacks, can you imagine their smell?

Interviewee 15: There might be a roasted smell after the Maillard reaction.

Interviewer: Okay. Do you think you would find these smells acceptable and enjoyable?

Interviewee 15: I think I can accept them. As for liking them, I would have to try them first and then judge based on the olfactory and gustatory aspects.

Interviewer: Okay. Among the sensory experiences we just discussed, including olfactory, gustatory, and visual, which one do you think is most important for you in choosing insect snacks?

Interviewee 15: I think it would be olfactory and gustatory.

Interviewer: Olfactory and gustatory, okay. Can you explain the reasons?

Interviewee 15: Because, in my opinion, visual aspects are not a big issue as everyone has their preferences. However, gustatory and olfactory experiences are connected during eating, and since we taste and smell simultaneously, I believe they are the most important when choosing
something to eat.

Interviewer: Alright, understood. Now, besides sensory attributes, what other factors do you think would influence your decision to purchase insect snacks?

Interviewee 15: I think one is its healthiness and whether it has specific functionalities. It has to have some attractive points for me to try since insects are relatively niche. It should offer some benefits, such as being healthier or having components beneficial for certain functions, like high protein or promoting gut health.

Interviewer: So, it needs some health claims to attract you?

Interviewee 15: Yes, to differentiate it from regular biscuits.

Interviewer: Are there any other factors?

Interviewee 15: Another factor could be the brand story. For instance, why they chose to make insect products. If their story is appealing to me, I might try it out of curiosity to taste its flavor.

Interviewer: Understood. Alright, now I'll show you a biscuit made with cricket flour, where 20% of the flour is replaced by cricket flour. Its taste is similar to regular biscuits. What are your thoughts after seeing it? Would you consider consuming it in the long term?

Interviewee 15: I think it looks like a regular biscuit. I would be willing to try it to see if I can distinguish the cricket flour from the regular ingredients. As for long-term consumption, I would still need to see if it tastes good.

Interviewer: So, you don't have an inherent aversion to it.

Interviewee 15: Right.

Interviewer: Okay. Now, suppose you see these three snacks at a convenience store like a 7-Eleven. You have to choose one. Which one would you choose?

Interviewee 15: I might choose the third one.

Interviewer: Can you explain the reason?

Interviewee 15: Because its packaging looks softer. The first one doesn't look like something edible; it seems more like it's for animals. The second one, I'm neutral about it; it looks more like something humans would eat.

Interviewer: Got it. Now, if I told you that the first two are more environmentally friendly, using less land and water resources, and their prices are the same, would you change your choice? Would you still choose the third one?

Interviewee 15: If I were to pick directly from the shelf, I would still choose the third one. However, if there were guiding factors suggesting I try the second one, I might consider it, but it probably wouldn't influence me much.

Interviewer: Okay. Good. Now, for all the product attributes we discussed, including sensory attributes and other aspects like the brand story and health claims, can you rank them in terms of importance from high to low?

Interviewee 15: If I were to try a new food, the claims or promotional phrases about it would be more attractive to me, as it's an opportunity to try something I haven't eaten before, regardless of whether it's good or bad. As for long-term consumption, I think the sensory experience is the most important.

Interviewer: Okay, understood. Now, if you could create your own insect snack, what flavors, ingredients, textures, and packaging would you prefer?

Interviewee 15: If I were to make it, I'd want the taste to be generally appealing, like a popular biscuit flavor. In terms of ingredients, I would replace some common ingredients with a portion of insect components. Regarding texture, it depends on what I'm making—whether it's biscuits, cereal, or something else. The texture should not differ too much from its original form, except that the ingredients include insects. As for packaging, I would go for something non-repulsive, with information about the insects on the side.

Interviewer: How would you attract consumers?

Interviewee 15: First, I would depict the product similarly to how other biscuits are packaged, with pictures of the product on the packaging. If I were making biscuits, I would include some insect-related wording to attract attention, like mentioning the use of certain insect components.

Interviewer: Okay. Next question, are there already insect foods in the Chinese market, such as fried grasshoppers or silkworm pupae, which many young people like? However, there are currently no insect snacks on the market. Do you look forward to the introduction of insect snacks in the future?

Interviewee 15: I think it's possible. The reason is that it's very rare, and I have some knowledge of insect foods from previous research. However, it's still a very niche area in the Chinese market. I think it would be a new experience if it could enter the market.

Interviewer: Okay. The last question, if you think it's necessary to popularize insect snacks among Chinese young people, what measures do you think need to be taken?

Interviewee 15: I think one measure is to increase its visibility. Since it's a relatively niche area, most people might not actively follow food trends. They might only look into it when they see it on the shelves. So, increasing visibility on various social media platforms would be a quick way to enter everyone's field of view. Another point is to promote its benefits, such as its environmental claims or its own functional advantages. This way, people will not only be interested but also have deeper motivation.

Interviewer: So, more marketing efforts.

Interviewee 15: Yes, exactly.

Interviewer: Okay, good. Thank you for your participation. Before we conclude, do you have any other questions?

Interviewee 15: Not at the moment.

Interviewer: Okay.

Interviewer: This concludes our interview. Thank you for your time, and your insights are valuable for my project. I will provide you with the final interview text and a copy of the final thesis. Please feel free to contact me for any further information. I will send you my email shortly. Thank you for participating. Interviewer: Got it. Now, if I told you that the first two are more environmentally friendly, using less land and water resources, and their prices are the same, would you change your choice? Would you still choose the third one?

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Interviewer: This concludes our interview. Thank you for your time, and your insights are valuable for my project. I will provide you with the final interview text and a copy of the final thesis. Please feel free to contact me for any further information. I will send you my email shortly. Thank you for participating.

Appendix C: Utilization of Artificial Intelligence

In conjunction with manual proofreading, this thesis used Artificial Intelligence, specifically Grammarly and ChatGPT for check the grammar of the content.