THE EFFECT OF SOCIAL IDENTITY ON FOOD CHOICE

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ABSTRACT

Previous research indicates that various factors influence food choice, such as health concerns, animal welfare, sensory appeal, food neophobia, and price. This thesis explores the effects of social identities on food choice. Hypotheses include that gender/political orientation/health-consciousness has effects on food choice. This thesis uses an online survey to collect data on Canadians. I run a hypothetical discrete choice experiment with four scenarios, and respondents are asked to choose a main dish and a side dish in each scenario. The methodology separates respondents' choices into the main dish choice model and the side dish choice model. The main dish choice uses the multinomial logit model (MNL), while the side dish choice model selects the binary logit model.

The MNL model analyzes factors that influence choices of vegetarian protein and meat products. Findings show that women and liberals are more likely to choose vegetarian proteins, while men prefer meat products. The binary logit model analyzes the determinants of choosing healthy foods. The results show that women and high-educated or health-conscious people are more likely to choose healthy foods. The main and side dish choice models reveal that when food is recommended by the dining companion, people are more likely to choose it. However, the recommendation from the dining companion who has the same/different social identities as others has the same effects on food choice. Therefore, this thesis finds the food choice motivations for different food products.

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Chapter 1—Introduction

1.1 General Introduction

People make food choice every day for every meal, but do people realize which factors drive their food choice? Consumers' food choice is heterogeneous and are affected by several variables. Some people who want to have healthy diets may choose organic or low-calorie foods, but others may prefer delicious foods that satisfy satiety. Food consumption has a tight correlation with social context because food has symbolic values and reveals identities and shows who we are and where we belong within society (Barauskaite et al., 2018, p.60). Food choices are linked to an individual's value system (Hoek et al., 2011, p.671). Therefore, people with different identities make different choices.

This thesis examines how social identities' effects on food choices. The social identity reflects a person's sense of self (Akerlof and Kranton, 2000, p.748) and includes some demographic characteristics. Gender is a typical example of a social identity, and women and men have different food choices (Furst et al., 1996, p.254; Renner et al., 2012, p.126). For instance, on average, women consume more vegetables and less meat than men (Graca, Calheiros, and Oliveira, 2015, p.114; Cavazza, Guidetti, and Butera, 2017, p.97; Hartmann and Siegrist, 2017, p.15; Kubberød et al., 2002, p.296). Political orientation is another example of a social identity, and liberals and conservatives have different food preferences. Liberals are more likely to accept novel foods, but conservatives prefer traditional foods (Pfeiler and Egloff, 2018, p.247; Dhont and Hodson, 2014, p.12).

Social interactions that occur in daily life, such as dining with others, can also influence food choices. Social interaction includes one-way and two-way interaction. Two-way social interaction is like an intersection between people. For example, when people are communicating, meeting, or dining with others, they can convey or exchange ideas, so this interaction may change their decisions. Or, when you go shopping at a grocery store and occasionally chat with someone around you, the stranger recommends a specific product to you, and you might follow that recommendation. One-way social interaction may happen when people find information from some source but cannot exchange ideas with that source. For instance, the Canada Food

Guide is a recommendation for healthy diets. Individuals may find this guide on the government website, but they cannot directly tell the government whether they follow this guide or not. However, if individuals leave their feedbacks on the government website, and someone responds to this feedbacks, this interaction will be a two-way social interaction. Also, people are likely to eat more when they have the chance to communicate with others (Herman, Roth & Polivy, 2003, p.874). This thesis explores the effects of food recommendations on food choices. For example, when a novel food is recommended by your dining companion, does the probability of novel food acceptance increase?

Individuals have diverse social identities and often have social interactions with others, so social identities and interactions can affect their decisions. Social interactions have specific effects on consumption, especially on eating behaviors. Social eating norms are appropriate constitutions of consumption for members of a social group, including amounts of foods or specific food choices (Higgs, 2015, p.39). For example, eating with family and friends makes people feel comfortable, so they are minimally impacted on food intake (Castro, 1994, p.453). Therefore, this thesis examines how social identities affect food choices. From this thesis, people can get some information about what and how social identities and social interactions influence their food choices.

1.2 Researchable Problem

This thesis examines how food choices are affected by different social identities and social interactions. People have various social identities in terms of political polarization, health, gender, and other aspects. When people interact with others, they may make different food choices. For example, a health-conscious person has a meal with a friend who is not health-conscious, the health-conscious person could affect this friend to choose healthy diets; otherwise, this person could be affected by this friend to try unhealthy foods.

Recommendations play an important role in food choice when people interact with each other. For instance, liberal people are likely to try novel foods, like meat substitutes, but conservative people are used to eating some traditional foods, like meat. When a liberal person and a conservative person eat together, a liberal person might encourage the conservative to try meat substitutes that may influence the conservative's choice.

Thus, this thesis examines the following hypotheses:

- Political orientation, gender, or health awareness impacts food choice.
- The recommendation influences food choice.
- Recommendations from a dining companion influences food choice.
- A recommendation from the dining companion who is from the same political orientation/gender/health awareness has a stronger effect on food choice.

1.3 Thesis Overview

In summary, this thesis finds effects from social identities and social interactions on food choice. The following chapters are in this thesis: literature review, survey design, methodology, results, analysis, limitations, and conclusion. The literature review introduces food choices. The literature review of food choices indicates several factors that influence food decisions, such as values, social norms, price, and contexts. The literature review of political effects provides descriptions of the right-wing and left-wing ideologies and offers examples of liberals' and conservatives' different food choices. The literature review of social interactions shows how social modeling, impression management, or social facilitation affects food intake and choices. The plant-based product is selected as an example to illustrate impacts from political orientation, social interactions, or other factors on a particular food. The literature review of plant-based products explores which factors can shift the choice from meat to plant-based products.

The section of survey design discusses the design of the questionnaire, especially the choice experiments. This part also offers a summary of respondents' characteristics. In this thesis, I conducted an online survey that had 803 respondents. The survey has a choice experiment and some questions relative to purchasing behaviors and demographic characteristics. In the choice experiment, respondents are given some hypothetical scenarios. For instance, respondents are told to imagine that they are dining alone or dining with a companion in a burger, taco, donburi, or palov restaurant. The dining companion has a particular gender, political orientation (liberal or conservative), and health orientation, and recommends one main dish choice and one side dish choice to respondents. Then, respondents need to make choices for their main dish and side dish. The main dish choice has a beef product, a chicken product, and a vegetarian product, and the side dish choice has healthy food and unhealthy food.

The theoretical frameworks of discrete choice models are presented in the methodology section, and the results and discussion sections summarize and compare regression results with

previous research findings. The main dish has more than two choices, so the methodology uses the multinomial logit (MNL) model. The MNL model estimates the factors that affect the choice of meat products and vegetarian proteins. The side dish uses the binary logit model because it has two choices, and this model explores factors that influence the choice of healthy foods. Discussion and analysis chapters compare research results with previous research. Results show that political orientation, gender, and health-consciousness impact food choices, so these social identities have effects on food choices. The food recommendation or the food recommendation from a dining companion influences food choices, so people are more likely to choose the recommended foods. These results are consistent with previous findings. However, the hypothesis that the recommendation from the recommender who has the same or different social identity as others affects food choices is not accepted, and this result is contrary to previous research. In addition, the conclusion summarizes the key points of the thesis, and future research can explore the underlying reasons.

Chapter 2—Literature Review

This chapter introduces four literature reviews. The first literature review is related to food choice. The second and third literature reviews examine the effects of social interactions and political orientations on food choice. The last literature review is about consumer demands for plant-based products, and it is a specific example to show how food choice motivations influence the food choices of novel products.

2.1 Literature Review of Food Choice

2.1.1 Food Choice Modeling

Furst et al. (1996), Sobal and Bisogni (2009) explore factors that affect food choices through food choice modeling. In food choice modeling, they find life course is a primary component of food choice. The life course is a basic and universal component of food choice through personal experiences and historical eras, current life trends and prediction of future events (Furst et al., 1996, p.252; Sobal and Bisogni, 2009, p.41). For instance, people may have different food purchasing decisions in the past ten years to now.

The individual life-course develops a set of influences: ideals, personal factors, resources, social framework, and food context. These are five dominant categories impacting food choices by "mutually shaping one another, and serving to reinforce, interacting and comparing with one another" (Furst et al., 1996, p.252).

2.1.2 Ideals

According to Furst et al. (1996), ideals indicate "aspirations, values, and sense of identity" (p.253). Ideals are referred to as the standards that individuals' food behaviors are assessed and judged as "right", "normal", "inappropriate", or "unacceptable" (Sobal and Bisogni, 2009, p.41; Furst et al., 1996, p.252).

Food choice values are factors people need to take into considerations when deciding which foods to buy/consume (Lyerly and Reeve, 2015, p.47). These values have specific

meanings and feelings that individuals add to considerations (Sobal and Bisogni, 2009, p.42). Preferences are the base of consumers' choices, but food values are more stable than preferences on ranking a particular set of foods or food attributes (Lusk and Briggeman, 2009, p.184). Values play a dominant role in explaining an individual's behaviors and motivating consumer purchasing decisions (Lusk and Briggeman, 2009, p.186). Values help individuals define their targets and show the standards that they "evaluate, justify, and compare the attitudes and behavior of themselves and others" (Grebitus, Steiner, and Veeman, 2012, p.397). Human values drive food choices and purchase propensity to better understand consumers' emotional engagement (Grebitus, Steiner, and Veeman, 2012, p.402).

Furst et al. (1996) and Lusk and Briggeman (2009) both have a list of food values. Furst et al. (1996) found six most frequently used values in the food choice: sensory perceptions, monetary considerations, convenience, health/nutrition, managing relationships, and quality (p.257). Lusk and Briggeman (2009) list eleven food values: naturalness, taste, price, safety, convenience, nutrition, tradition, origin, fairness, appearance, and environmental impact (p.187). Although consumers are heterogeneous, U.S. consumers think, on average, safety, nutrition, taste, and price are relatively the most important food values. Compared to other food values, environment, fairness, and tradition are the least important food values (p.191).

Individuals use heuristics to negotiate and balance values in order to simplify food choices (Sobal and Bisogni, 2009, p.43). Therefore, consumers who care about these important values are more likely to buy foods that embody these values. For instance, consumers who think naturalness, environment, and fairness are more important are more likely to purchase organic foods (Lusk and Briggeman, 2009, p.194).

2.1.3 Personal Factors

Personal factors are individuals' attributes and characteristics that affect food choices (Sobal and Bisogni, 2009, p.42). Personal factors show what is obvious and meaningful to humans based on needs and preferences determined by psychological and physiological characteristics (Furst et al., 1996, p.254). Psychological factors, such as pleasure, health, and safety, determine how salient a food or a characteristic of the food is (Furst et al., 1996, p.254). Physiological factors, like the sensory sensitivity of food taste, hunger, and allergic response, affect food choices.

Because food choices influence nutrition, health, and disease, consumers want to choose safe and high-quality foods (Botonaki et al., 2006, p.78; Lyerly and Reeve, 2015, p.47). The food value of health and nutrition is related to avoiding and controlling diseases (such as heart disease, cancer, or hypertension), weight control, and the well-being of the body (optimal health) (Furst et al., 1996, p.258). For instance, the willingness to decrease meat consumption is impacted by health motives (Pula, Parks, and Ross, 2014, p.15). In addition. the individual who has diabetes will put health higher than other food values (Sobal and Bisogni, 2009, p.43).

Hunger is a great reason and a unique motive for eating behavior (Renner et al., 2012, p.125). Taste is the determinant factor for sensory perception, but the individual taste has large differences (Furst et al., 1996, p.257; Renner et al., 2012, p.118). For example, willingness to buy seasonal fruits are impacted by taste (Pula, Parks, and Ross, 2014, p.15).

2.1.4 Resources

Resources are the assets that people should take into account when making food choices and include tangible (money, equipment, and space) and intangible resources (time, skills, and knowledge) (Furst et al., 1996, p.254; Sobal and Bisogni, 2009, p.42).

Some U.S. consumers think time and convenience are particularly important, so convenient foods which are fast and don't require high skills are good choices for them. According to Dimitri and Rogus (2014), convenience affects supermarkets and manufacturers to satisfy consumers' demands for convenient and east-prepared foods (p.22).

In supermarkets, the number of available (or the convenience of buying) healthful foods on shelves is related to the diet quality of neighborhoods nearby this area. Studies show that low diet quality and high BMI are correlated to higher available energy-dense foods and lower available low-calorie and nutrient-dense foods available in the area (Dimitri and Rogus, 2014, p.23). In addition, if the nearby stores within one block of home do not sell fresh vegetables on shelf space, consumers will consume the lowest average of vegetables than consumers whose nearby stores sell lots of fresh vegetables on shelf space (Dimitri and Rogus, 2014, p.23).

When making food decisions, consumers have monetary considerations that are composed of price and the perceived value of food to be bought (Furst et al., 1996, p.257). Low-income consumers are more sensitive to prices than high-income consumers (Dimitri and Rogus, 2014, p.23). For instance, low-income consumers may prefer meat products than high-priced

meat substitutes.

Although food price plays the most important role in food purchasing decisions, consumers' decisions are determined by more factors than price. Price is related to other values, such as convenience, food quality, health, and family preferences (Dimitri and Rogus, 2014, p.22). Health or the healthfulness of foods, price or affordability, and convenience or accessibility are relatively important motives (Renner et al., 2012, p.118).

2.1.5 Social Framework

Interpersonal relationships, social roles, and social norms are social frameworks that can affect food choices.

Some demographic characteristics are social roles, such as gender and political orientation, and have various influences on eating motivations. For instance, the different age group has diverse motivations. According to Renner et al. (2012), motivations for young adults could be need, hunger, pleasure, convenience, and visual appeal, but old people's eating motivations are health and natural concerns (p.126).

Interpersonal relationships complicate the food choice. One study shows when people make food choices, they often consider others' needs and preferences in order to manage this relationship (Furst et al., 1996, p.259). There are some conflicts in food choices, so people need to predict, solve, and accommodate these problems to harmony (Furst et al., 1996, p.259).

Dining together is sociable and is a component of social occasions, so social norms affect eating behavior and food choices (Renner et al., 2012, p.117; Higgs, 2015, p.38). The social image of food is an effective factor in social norms and co-varies with social norms, traditions, and social ability due to impression management. For example, in impression management, individuals change their eating behavior because they want to leave certain impressions (Renner et al., 2012, p.125).

2.1.6 Contexts

According to Sobal and Bisogni (2009), contexts are "the environment in which lives are lived" (p.41). Whether a food fits the consumption context (appropriateness) drives food choices (Gutjar et al., 2014, p.109), such as "proper meals", or "what should I eat". For instance, compared with dinner items, people prefer breakfast items in the morning (Gutjar et al., 2014,

p.112).

The food context gives the food choice an environment that results in particular behaviors and can expand or limit choice possibilities (Furst et al., 1996, p.256). Ratings of appropriateness are different in consumption situations and can forecast the satisfaction of foods that are correlated with repeated purchasing behaviors of consumers (Gutjar et al., 2014, p.113). Food contexts contain physical and social environments and food supply factors, including types of foods and food availability (Furst et al., 1996, p.256).

The eating atmospheres, such as the company, temperature, lighting, odor, and noise, impact the eating patterns by changing the immediate environment. For instance, dining with others can have extended meals and overconsumption, but dining with unfamiliar people may inhibit food intake (Dimitri and Rogus, 2014, p.24).

Consumption norms include standard packages, plate sizes, and the amount or volume of food consumed by the person that is helpful to determine how much consumers should consume (Dimitri and Rogus, 2014, p.24). Various packages and shapes differentiate consumptions and monitor the intake quantity easily. Here are examples. Consumers who purchase multiple small packages will realize stopping points by small packages but increase total consumption. Tall glasses and deep bowls decrease intake because consumers care more on vertical than horizontal dimensions (Dimitri and Rogus, 2014, p.24). The ease or effort in getting foods shows consumers' food preferences and consumption quantity; for example, when the food package is open, it is likely to be eaten fully (Dimitri and Rogus, 2014, p.24).

2.2 Literature Review of Effects from Social Interaction on Food Choice

Social interactions have specific effects on consumption, especially on eating behaviors. When people dine with different companions, they have different food choices and behaviors than when dining alone, such as eating more or less. For example, according to Herman, Roth, and Polivy (2003), people tend to eat 40% to 50% more when dining with a companion than when eating alone (p.874). This literature review introduces why and how social interaction affects food choices and includes some examples.

2.2.1 Identity, Social Norms, and Group Norms

A person's sense of self is associated with diverse social categories that influence how

people should behave (Akerlof and Kranton, 2000, p.748). Identity and social norms have a similar role in guiding eating behaviors, and the group norm offers the reason why people often follow others' behaviors.

People have a sense of themselves that is called identity (Akerlof and Kranton, 2000, p.715). In an internalization process, identification is a critical part: "a person learns a set of values (prescriptions) such that her actions should conform with the behavior of some people and contrast with that of others" (Akerlof and Kranton, 2000, p.728). For example, women and men often choose foods that conform to their identity, so women typically eat feminine foods when men choose masculine foods.

Identity is for a person, but society consists of many people and contains multiple identities. Social norms are "implicit codes of conduct that provide a guide to appropriate action" (Higgs, 2015, p.38). People will feel they are more socially responsive and more likely to be accepted by others if following social norms (Higgs, 2015, p.39).

Social norms include descriptive norms and injunctive norms. Descriptive norms are "perceptions of the prevalence or extent of a behavior" that are what others do (Higgs, 2015, p.39). According to Mollen et al. (2013), this norm provides information about the correct actions in a particular situation; for example, it has the greatest impact on low effortful cognitive activities, such as quick decisions that are made in the food court (p.87). Thus, they affect behaviors and deliver an accurate goal to people: "if a lot of people are doing it, it must be right" (Mollen et al., 2013, p.83). Injunctive norms are "perceptions about what behavior is expected" that is what others endorse (Higgs, 2015, p.39) or behaviors that most others approve or disapprove of (Mollen et al., 2013, p.84). Injunctive norms have more impacts if self-regulatory resources are high (Mollen et al., 2013, p.84).

People of the same or different identities establish the group norms. Individuals are more likely to follow the choice norm of "in-group" members who have a shared identity because, in the group environment, members provide the most reliable information (Higgs, 2015, p.41).

According to Akerlof and Kranton (2000), the person's behavior evokes others' responses (p.717). People often follow an "in-group" eating norm and desire to "act correctly", because they hope to be liked, and because conformity to the group norm is a rewarding experience (Higgs, 2015, p.39; Higgs and Thomas, 2016, p.2). Being "in-group" means averting the behavior of "out-groups" that "are disliked, seen as lower status, or dissimilar" so that they will

be away from that group (Higgs, 2015, p.41). People try to find a sense of belonging to an "in-group". For instance, to avoid the "wrong" behavior, when eating with others, people would directly copy the behavior of that in the "in-group" (Higgs, 2015, p.40).

Therefore, identity, social norms, and group norms explain why social interaction affects eating behaviors or food choices. The following part shows how social interaction changes eating norms.

2.2.2 Impression Management, Social Modeling, and Social Facilitation

Eating with a companion expands the hedonic effects of the experience but also influences sensory or hedonic responses to food cues and food consumption (Higgs and Thomas, 2016, p.2; Higgs, 2015, p.42). People adjust their food preferences by norms positively, so they can eat like other people (Higgs and Thomas, 2016, p.2). The reason could be that people are more likely to be liked by group members when they have the same eating behaviors as others. Therefore, when people have interactions, they may adjust their eating to be the same as their partners' perceived values and preferences (Herman and Polivy, 2006, p.273). Impression management, social modeling, and social facilitation are three ways to impact food choices.

What one eats affects social judgment from others significantly. Eating is a vulnerable social event with social impacts, such as impression management from consumption stereotypes (Vartanian, Herman and Polivy, 2006, p.266). Existing heightened motivations, such as leaving good impressions, will have high rewarding values or outcomes. People will hope to change if their image is threatened (Vartanian, Herman and Polivy, 2006, p.272). For instance, if an individual is disliked by others, he/she can choose to follow other' behaviors to improve his/her image.

Vartanian, Herman and Polivy (2006) found that eating stereotypes contribute to self-judgments, and these judgments can affect food choices to establish or maintain the desired self-image (p.266). People will control their eating behaviors in order to leave a good impression on others. For example, people might eat a small amount of food to deliver a feminine positive image (Higgs, 2015, p.39).

The definition of the social modeling is that people are likely to eat similar food and amounts of food as others eat (Herman, Roth and Polivy, 2003, p.873). The degree of modeling is impacted by the quality of social interaction (Higgs, 2015, p.39), including the level of

uncertainty about what is “normal” in a certain situation, how much importance is placed on “fitting in”, and personality traits, like self-esteem and empathy (Higgs and Thomas, 2016, p.2).

When modeling a food intake norm, social acceptance concerns are significant (Higgs, 2015, p.39). If the level of social acceptance is already high, the probability of modeling is low. Eating with strangers has greater modeling effects on intake than eating with siblings (Higgs, 2015, p.41). The reason could be that people have been accepted by the social partner in a friendly manner and need a little need to ingratiate themselves, so their behaviors are less likely to follow the social norm (Higgs, 2015, p.39).

Social facilitation of eating indicates that, compared to eat alone, people’s food intake increases when they eat together (Herman, 2015, p.61). People’s eating choices tend to be affected by eating choices from others who have a social connection with them, such as family, friends, or colleagues (Higgs and Thomas, 2016, p.2). People tend to follow eating norms in order to enhance their affiliation with a social group and to be liked and correct (Higgs, 2015, p.39).

2.2.3 Effects on Food Choice from Different Social Interactions

Conformity to group norms has a positive impact on self-perception and attitudes (Higgs, 2015, p.42). In terms of health value and caloric content, Vartanian, Herman and Polivy (2006, p.267) listed “good” foods and “bad” foods, and they found that people who eat “good” foods are rated as “more physically attractive, more likable, and more moral” than people who eat “bad” foods. Therefore, according to Higgs and Thomas (2016), several studies show social norms promote healthier eating intentions and behavior effectively (p.3).

Following dietary recommendations is a good way to know food safety and nutrition (Higgs, 2015, p.40). For example, if I identify the reference group that uses the “healthy” food choice as an observed norm, I will think of myself as the type of person who chooses “healthy” foods and acts consistently with this self-identity (Higgs, 2015, p.42). However, people are more likely to follow the reference group’s choices, regardless of healthy food or unhealthy food. According to Mollen et al. (2013), if people believe others before them had chosen unhealthy foods, only a few people will choose healthy foods (p.84).

Healthy descriptive norm perceptions have positive associations with healthy food intake and impact trends to eat healthy foods and diets (Mollen et al., 2013, p.84). Healthy social norms

increase the choice of healthy foods, compared to the unhealthy descriptive norm sign (Mollen et al., 2013, p.87). According to Mollen et al. (2013), the social environment's positive effects could be stronger than potential negative effects (p.87). Reasons may include fighting for unhealthy norms, such as many people eating unhealthy foods, and the goal of a healthy life due to the social environment (Mollen et al., 2013, p.87). However, there are some opposite findings. For example, palatability also drives food choices. Although the social norm suggests people select more of the healthy food, people may change their decisions to tasty unhealthy foods when they lack self-control (Higgs, 2015, p.42). Also, if people watch movies or go to parties, they will prefer unhealthy foods.

People have impacts on others' choices whose gender is different from them. Some people think it is more crucial to be socially appealing to the opposite-sex person than to the same-sex person (Vartanian, Herman and Polivy, 2006, p.272). An interesting finding is a man can change a woman's choice, but a woman cannot change a man's choice. For instance, Vartanian, Herman, and Polivy (2006) found that when females interact with males, they think it is important to perform feminine, but males think it is important to show masculine when interacting with males and females (p.272). The reason could be men cause non-conformity in eating because they could be more distinct than women, and women are more willing to promote positive social bonds than men (Higgs, 2015, p.41).

Although novel foods attract more interests than familiar foods (Visalberghi and Fragaszy, 1995, p.1095), people may reject novel foods due to food neophobia. However, social interaction could change novel food choices.

Food choices of novel foods could be advantageous, so individuals need to balance their interests in novel foods with caution to find and avoid toxins and other hazardous substances (Visalberghi and Fragaszy, 1995, p.1089). Through the phenomenon of social facilitation, social context facilitates to consume homogeneous foods (Visalberghi and Fragaszy, 1995, p.1090). However, according to Visalberghi and Fragaszy (1995), social facilitation is more evident in behaviors to unfamiliar foods than to familiar foods (p.1094), so when people eat together, they are more likely to try novel foods. In addition, if consumers have a companion from who eats novel foods, they will be attracted and have interests in novel foods (Visalberghi and Fragaszy, 1995, p.1095).

In one study, consumers' responses to novel foods are impacted by recommendations

(Alemu et al., 2017, p.46). When facing novel food products, consumers look for suggestions and recommendations from others and want to know more information about them (Alemu et al., 2017, p.46). Thus, consumers will lower their uncertainty about the food through a recommendation from others and feels relaxed by learning others' experiences (Alemu et al., 2017, p.54).

2.3 Literature Review-Political Effects on Food Choices

Individuals have diverse political and social ideologies, and political ideologies which are determined by social, cognitive, and motivational aspects (Jost, 2009, p.129). Political ideologies describe "how and why some individuals and groups justify, whereas others contest existing 'social and political arrangements'" (Jost, 2009, p.129). Moreover, individuals' political ideologies are defined as: "the belief of a human being about the purpose of human life" (Greenberg and Jonas, 2003, p.380; Lindeman and Sirelius, 2001, p.176). Therefore, individuals are different in their political ideologies because their beliefs and preferences are different for how the society or government shall work and achieve specific targets (Lusk, 2012, p.530). This literature review introduces the right-wing and left-wing and differences of food choices between right-wingers and left-wingers.

2.3.1 Introduction of Right-wing and Left-wing

Political ideologies are often placed on a spectrum from an extreme "left-wing" to an extreme "right-wing". "Left-wing" indicates a liberal ideology when "right-wing" means a conservative ideology. "Left-wingers" are defined as preferring more social/cultural democracy and more state control of the economy (Lusk, 2012, p.531), and the "left-wing" label is linked with "progressive social change and egalitarian ideals" (Jost, 2009, p.130). "Right-wingers" desire more social/cultural control from the state or religion and less state control of the economy (Lusk, 2012, p.531), and the "right-wing" is "conservative, supportive of the status quo, and hierarchical in nature" (Jost, 2009, p.130). Thus, two main differences between conservative ideology and liberal ideology are the order of social change and stability in general preferences, and the relative acceptance of unequal society and economics (Lusk, 2012, p.531; Jost, 2009, p.134; Greenberg and Jonas, 2003, p.380).

2.3.2 Political Orientations' Effects on Food Choice

Food choice is guided by several interacting variables related to the product, the context, and the person. Food choices involve biological, physiological, psychological, and sociocultural variables (Cliceri et al., 2018, p.277). Food is not only defined as supplementary nutrition but also has a social meaning and cultural significance. Food is important for human flourishing by supporting "communal relations, religious rites, personal milestones, cultural festivals, and a wide variety of everyday interactions" (Mayes and Thompson, 2014, p.163).

When food plays a role in creating social bonds and combinations, the refusal or unacceptance of a particular food could be a strong social and cultural statement (Mayes and Thompson, 2014, p.165). Shared meals support a sense of identity because shared meals can connect with the familiar environment and assist in building the community. When choosing what they eat specifically, people often position themselves in a culture or group (Chuck, Fernandes, and Hyers, 2016, p.425). Socio-political motivations can drive food consumption choices (Malone and Norwood, 2019, p.1; Pfeiler and Egloff, 2018, p.247). For example, vegetarians' reasons for their dietary choices that include animal ethics, world hunger, the ideology of nonviolence, and the concern for environmental issues (Lindeman and Sirelius, 2001, p.182). When people's food decisions are associated with some social and political issues of food, they are political eaters (Chuck, Fernandes, and Hyers, 2016, p.426). Therefore, their food choices can be influenced by some problems, such as "the exploitation of food producers, abuse of animals, environmental destruction, serious healthcare issues, and unfair distribution" (Chuck, Fernandes, and Hyers, 2016, p.425).

2.3.3 Differences of Food Choice between Right-wingers and Left-wingers

Due to different characteristics, liberals and conservatives have different food choices. Conservatism has been correlated with hesitating to "trust-sensitive scientific arguments", so conservatives are less likely to have positive attitudes to cultured meat and have less willingness to try it (Wilks et al., 2019, p.138). Liberals have the characteristic of openness that is positively related to the willingness to try novel foods (Pfeiler and Egloff, 2018, p.247). Liberals are likely to eat more fresh fruit daily than conservatives by 28% (Murphy, 2011). However, liberals and conservatives do not have significantly distinct differences in their gluten-aversion levels (Malone and Norwood, 2019, p.11).

Food choices' differences between right-wingers and left-wingers include animal consumption (Dhont and Hodson, 2014, p.12). Generally, animal rights and concerns are more central to left ideology (Hodson and Earle, 2018, p.76). Conservatives are likely to eat more meat in daily diets (Dhont and Hodson, 2014, p.12). Individuals who support right-wing attitudes and values have a higher probability to consume animal products and identify themselves as meat-eaters (Dhont and Hodson, 2014, p.12; Hodson and Earle, 2018, p.76; Pfeiler and Egloff, 2018, p.247). Dhont and Hodson (2014) found that the right-wing ideologies' meat consumption is through two psychological processes: human has superior ideology than animals and realizing the threat of animal-rights ideologies on the primary carnist ideology (p.16).

From several studies, the convergent evidence proves omnivores and vegetarians advocate different value sets. Vegetarians are linked with liberal values that include more openness in their personalities, more variety seeking, and less food neophobic, and omnivores are more linked with conservative values (Ruby, 2012, p.145; Forestell et al., 2012, p.323; Pfeiler and Egloff, 2018, p.250). When being surveyed, among liberals, 10% of them show they are vegetarians, compared to 3% of conservatives (Murphy, 2011). In the US, women physicians who define themselves as "conservative" are two times less likely to be vegetarian than those who characterize themselves as "very liberal" (Ruby, 2012, p.145).

2.4 Literature Review of Plant-Based Products

There is an increasing number of meat substitutes available to consumers, including well-known brands, such as *Beyond Meat* and *Impossible*. Meat substitutes are "primarily vegetable-based food products that contain proteins made from pulses (mainly soy), cereal protein, or fungi" (Hoek et al., 2011[2], p.662). The availability of various meat substitutes indicates that consumers are paying attention to these novel products and increasing their consumption of meat substitutes. Sales of meat substitutes have grown consistently (Hoek et al., 2011, p.662). For example, in Europe, the market for meat substitutes and other plant-based alternatives has been expanding greatly (Faber et al., 2020, p.1). In this section, I discuss various reasons for the adoption of meat substitutes, including environmental sustainability, health concerns, and animal rights or welfare arguments, social identity, food neophobia, and sensory appeals.

2.4.1 Meat Consumption

Although plant-based foods have gained traction and attention in many industrialized western countries, they still have smaller market shares than animal-based products (Graca et al., 2019, p.19). One of the reasons for the relatively small market shares of meat substitutes could be the cultural role of meat in Western diets (Slade, 2018, p.429). Meat has been invested with a social construction beyond its biological role and nutritional properties; the consumption of meat often indicates some aspect of social identity (Graca, Calheiros, and Oliveira, 2015, p.114). Throughout history, meat consumption has been used to establish social distinctions in wealth and status (Schösler, Boer, and Boersema, 2012, p.40).

More recently, meat-eating has become associated with conservative political ideology, and many omnivores connect meat substitute consumption with femininity, earthiness, and a liberal ideology (Slade, 2018, p.429). Habits have a significant influence on food choice (Graca, Calheiros, and Oliveira, 2015, p.114). For example, some people may have the habit of eating meat in every meal. Many consumers are unwilling to change eating habits because they think "proper" and "attractive" meals should contain meat as the "center of the plate protein" (Graca et al., 2019, p.20).

2.4.2 Environmental Concerns

Meat production has serious consequences for environmental sustainability. The production of animal-based foods is thought to threaten ecosystems through land degradation, lead to a loss of biodiversity and contribute to climate change (Graca et al., 2019, p.19; Hoek et al., 2004, p.265; Hartmann and Siegrist, 2017, p.11; Apostolidis and McLeay, 2016, p.75; Machovina, Feeley, and Ripple, 2015, p.420). Animal-based products are likely to have larger effects on greenhouse gas (GHG) emission, biomass use, and reactive nitrogen mobilization than plant-based products (Graca, Calheiros, and Oliveira, 2015, p.113). For example, Reipurth et al. (2019, p.288) find that the consumption of plant-based diets reduces greenhouse gas emissions by 36% compared to the consumption of animal products.

There are have been few political efforts to decrease consumers' consumption of meat and dairy products. It has been suggested consumers raise their awareness of the environmental costs of animal protein and need to change their nutrition behavior from meat to meat substitutes (Hartmann and Siegrist, 2017, p.12). For instance, in Australia, meat consumers who believe

meat production has effects on climate change are more willing to adopt meat substitutes (Malek, Umberger, and Goddard, 2019, p.125).

2.4.3 About health concerns

Several recent food guides have recommended increasing the consumption of plant-based proteins, such as *Canada's Food Guide*, *USDA Food Patterns*, and *Harvard's Healthy Eating Plate* (Government of Canada, 2019; FAO, 2020; Harvard Health Publishing, 2017). In the UK, the Department of Health suggests that meat consumption needs to drop to around 70g per person/day to reach healthy levels (Apostolidis and McLeay, 2016, p.75). Plant-based diets reduce the health risk from the intake of meat products, such as excessive ingestion of saturated fat and cholesterol. Plant-based diets are diverse and contain some health-promoting elements, such as higher amounts of fiber, folate, antioxidants, carotenoids, and phytochemicals (Graca, Calheiros, and Oliveira, 2015, p.114; Graca et al., 2019, p.19). The adoption of plant-based diets contributes significant gains for public health because of lowering the risk of certain cancers, cardiovascular diseases, and type 2 diabetes (Reipurth et al., 2019, p.288; Apostolidis and McLeay, 2016, p.74). However, the effects of reduced meat consumption may not be universally positive. Red meat provides a good source of high-quality proteins, beneficial fatty acids, and a variety of micronutrients, such as vitamins and minerals, for optimal health. Lean red meat has a high protein and the satiating effect that are useful for weight loss and weight maintenance (Wyness, 2015, p.227; McAfee et al., 2010, p.10).

2.4.4 About animal welfare

The concern for animal welfare is a key driver of the increased consumption of meat substitutes and the adoption of meatless diets (i.e. vegetarianism) (Hoek et al., 2011, p.664; Apostolidis and Mcleay, 2016, p.76; Hartmann and Siegrist, 2017, p.23; Malek, Umberger, and Goddard, 2019, p.116). The consumption transition from the meat-based to plant-based protein is beneficial for animal welfare (Hartmann and Siegrist, 2017, p.11). Verbeke and Viaene (2000) find that concern for animal welfare is related to a reduction in beef and pork consumption. They suggest that animal welfare will be a hurdle for the meat industry in the future (p.149).

2.4.5 About social identity

Social identity plays a significant role in food choice and affects plant-based product consumption. In a social group, social eating norms are perceived as standards for compositions of appropriate consumption, including the specific food choices (Higgs, 2015, p.39). Sometimes, people judge who you are by what you eat. Eating "differently" is a critical part of one's identity and facilitates to confirm whether this person's status is a role member (Schösler, Boer, and Boersema, 2012, p.46; Carfora, Caso, and Conner, 2016, p.24).

Vegetarianism is a kind of social identity. Vegetarians share similar attitudes towards food. They are likely to prefer eating together to reinforce social relationships (Hoek et al., 2004, p.270). Gender is an example of social identity. Vegetables, dairy products, fish, fruit and sweets are perceived as feminine foods (Graca, Calheiros, and Oliveira, 2015, p.114; Cavazza, Guidetti, and Butera, 2017, p.97; Hartmann and Siegrist, 2017, p.15), so women agree with meat avoidance. However, red meat is identified as the prototypical food for men, so men seem to be more reluctant than women to reduce meat consumption and disagree with meat avoidance. Based on experience, men and women know what foods to choose to meet the gender role expectations (Cavazza, Guidetti, and Butera, 2017, p.97).

2.4.6 About sensory appeals

Sensory appeal, which includes elements such as appearance, taste, and texture, has been identified as one of the most critical determinants of meat desirability and meat avoidance (Tucker, 2014, p.169; Elzerman et al., 2010, p.233). A good taste experience with plant-based products decreases the intake of meat, fish, dairy, and eggs (Reipurth et al., 2019, p.291) and increases the consumption of meat substitutes; on the other hand, if consumers don't have a pleasant taste experience of plant-based products, consumers subsequently reject these products. Plant-based meals add a variety of food choices and may attract consumers who are driven by an adventurous taste, such as insects (Schösler, Boer, and Boersema, 2012, p.41). Moreover, the appearance of meat substitutes is vital. When consumers find meat substitutes have a similar appearance to meat products, they feel clear about how to prepare/eat them (Elzerman et al., 2010, p.233).

2.4.7 About food neophobia

Food neophobia (a fear of novel foods) generally harms the adoption of plant-based and other novel products. Meat substitutes have limited acceptance due to the sense of unfamiliarity whereas meat offers a sense of tradition and familiarity (Hoek et al., 2011, p.670; Hartmann and Siegrist, 2017, p.22). Therefore, food neophobia is "a barrier on the first trial with meat substitutes" (Hoek et al., 2011, p.664). In the meal context, if an unfamiliar food is relevant to familiar foods in an individual's diet, the acceptance of the unfamiliar food will be changed (Elzerman et al., 2010, p.238). When meat substitutes are served in a smaller size as a part of the dish, such as in the soup, a sauce, or a topping, they are deemed to be more acceptable (Elzerman et al., 2010, p.233). Moreover, consumers are more willing to accept meat substitutes served with spaghetti, compared to with a soup (Hartmann and Siegrist, 2017, p.21). The reason could be, in different meal contexts, consumers have different tastes of meat substitutes (Hartmann and Siegrist, 2017, p.21).

2.4.8 Convenience and price

Convenience and price also impact the acceptability of meat substitutes. Plant-based products have different meal formats, so these products need skills and food knowledge that consumers are not familiar with (Schösler, Boer, and Boersema, 2012, p.45). If consumers think preparing plant-based food is easy, they are more likely to have a higher plant-based intake and a lower animal product intake (Reipurth et al., 2019, p.291). Hence, the difficulty level of food preparation decides the convenience of meat substitutes. Price is an important food value and plays a role in the consumption of plant-based products. For example, price is correlated with the willingness to decrease meat consumption and increase plant-based diets (Graca et al., 2019, p.23). However, if the price of the plant-based product is much higher than meat products, consumers who care about the price will choose meat instead of plant-based products.

2.4.9 Information provision

Accurate information provision increases consumer awareness, encourages the adoption of plant-based diets and changes consumers' attitudes and preferences to plant-based products (Reipurth et al., 2019, p.291; Slade, 2018, p.436). In Western countries, many consumers still think red meat is a healthy and essential part of a diet, and most consumers haven't realized the

negative effects of red meat consumption on the climate (Vainio, Irz, and Hartikainen, 2018, p.218). This due to a lack of information about plant-based diets. Information related to health, environment, and animal welfare should help consumers have a better understanding of plant-based products. Because consumers have heterogeneous cognitive abilities to evaluate information, the information messages need to be sufficiently clear to the target group (Vainio, 2019, p.76). Verbal information and labeling are excellent information provisions for most consumers. Verbal information introduces the product use and brings product exposure that decreases the negative neophobic responses of meat substitutes. From the product labeling, consumers can identify some nutrient information in meat substitutes, such as low-fat content. Hence, the labeling conveys the credence attributes to drive consumers' meat purchase decisions (Apostolidis and McLeay, 2016, p.84; Malek, Umberger, and Goddard, 2019, p.124).

Chapter 3—Survey Design and Administration

Chapter 3 introduces survey designs. This chapter summarizes the survey questionnaire and respondents' choices. The survey questionnaire has two sections: choice experiment and survey questions. The second part of the chapter is the administration that shows treatment levels and the efficient design of the choice experiment. The next part summarizes the distribution of respondents' choices, such as demographic characteristics, purchasing behaviors, food values, etc.

3.1 Survey Description

The survey design began in June 2019 and was completed in January 2020. The ethics approval from the University of Saskatchewan Behavioural Research Ethics Board was received in November 2019 (Beh-1527). The questionnaire was administered by the Social Sciences Research Laboratories (SSRL) at the University of Saskatchewan using a third-party vendor to recruit respondents. This is an online survey for respondents across Canada. SSRL launched the survey on March 2, 2020 and finished the data collection on March 5, 2020.

Before launching the survey, I did internal and external pilots in February 2020. The internal pilot has 17 participants who are graduate students from the Department of Agricultural Economics of the University of Saskatchewan. The external pilot is an online survey across Canada and has 31 participants. Pilots' questions are the same as the survey questionnaire, but with the addition of questions about the naturalness of each scenario and respondents' familiarity with the food described in the menu. Participants' responses show that scenario descriptions seem to be natural to most of them. Others who think scenarios are unnatural provide their comments, and I made light modifications of the survey on this basis. Hence, the survey did the manipulation check and was accepted.

The questionnaire was designed to collect information on food choices and includes a choice experiment and survey questions. The choice experiment explores the respondents' food choices when they face different descriptions of dining scenarios. Moreover, survey questions

include demographic characteristics, political orientations, health consciousness, purchasing frequency of meat and meat substitutes, and food values.

3.2 Administration

3.2.1 Treatment levels of the choice experiment

In the choice experiment, respondents face four hypothetical scenarios: in one scenario, the respondent is told to imagine that they are dining alone, and in the other three scenarios, they are asked to imagine that they are dining with a companion. In the choice scenario, we describe the dining companion as having a particular gender, political orientation (liberal or conservative), and health orientation. The choice experiment's goal is to understand consumer motivations for purchasing particular foods, such as vegetarian or meat products. Particularly, it examines whether the food recommendation and the recommender's political orientation and health status influence others' choices.

In the survey design, there are six different treatment levels, as described in *Figure 2.1.1*. In the first treatment level, the respondent is assigned to a restaurant. This restaurant could be a burger restaurant, a taco restaurant, a donburi restaurant, or a palov restaurant. The menus for these restaurants are contained in *Appendix 1*. These types of restaurants were chosen because they all have both meat and vegetarian options, and they vary by their familiarity: we expect that respondents are familiar with burger and taco restaurants, but unfamiliar with donburi and palov restaurants. Donburi is a Japanese rice bowl dish, and its ingredients in the dish are simmered together and served over rice. Palov is a rice dish common in Uzbekistan, and all ingredients are cooked together with a blend of spices. Menus also provide descriptions of these foods. Prices of the beef and chicken options are $10, and the price of the vegetable option is varied from $8 to $12.

In the second treatment level, the respondent is randomly assigned to a scenario. This scenario is dining alone or dining with a companion. When facing the scenario of dining alone, respondents simply order from the menu. The companion is allocated as a male or a female, and the name of the companion could be James, Robert, Patrick, Emma, Jessica, or May. Each respondent will only see the particular dining companion once.

In the third treatment level, this dining companion is assigned to have a particular political orientation. The companion could be liberal or conservative, so the respondent may

have the same or different political orientation as this companion. The fourth treatment level assigns the companion's health orientation. The respondent could dine with a companion who is described as having a healthy orientation. Or the respondent doesn't know any information about the companion's health orientation so that this health orientation doesn't influence this respondent. There are some different descriptions of the companion's political orientation and health-consciousness. For instance, "the companion has recommended a book that he read during the vacation that seemed to have a conservative viewpoint", or "the companion says that she has just started volunteering for the liberal party". In the pilot, participants are asked to choose the political orientation and health-consciousness of the dining companion in each scenario, and most participants choose the same political orientation/health-consciousness as the scenario description. Hence, despite different descriptions, respondents get the information conveyed in the scenario.

The fifth treatment level is given a recommendation from three entrees--chicken, vegetarian, or beef. The sixth treatment level is the respondent's side dish recommendation, which could be a healthy choice (salad) or an unhealthy choice (fries, chips, tempura, or onion rings).

In the choice descriptions, scenarios are composed of six treatment levels, and each scenario of dining with a companion has four choice descriptions[1]. The introduction and details of the health orientation and political orientation are different in choice descriptions. Each respondent is assigned three of four choice descriptions. For example, *Figure 2.1.2* is the choice scenario for a respondent that is assigned to the burger restaurant (first treatment level). The dining companion Patrick (second treatment level) is conservative (third treatment level) and health conscious (fourth treatment level), and he recommends vegetarian burger and fries (fifth and sixth treatment levels) for the respondent. *Figure 2.1.3* is another example of the choice scenario for a respondent. The respondent is assigned to a donburi restaurant (first treatment level), and the dining companion Jessica (second treatment level) is liberal (third treatment level) and health conscious (fourth treatment level). She recommends the tofu donburi and salad (fifth and sixth treatment levels).

[1] Choice descriptions are attached in Appendix 2

Figure 2.1. 1: Process of the Choice Experiment

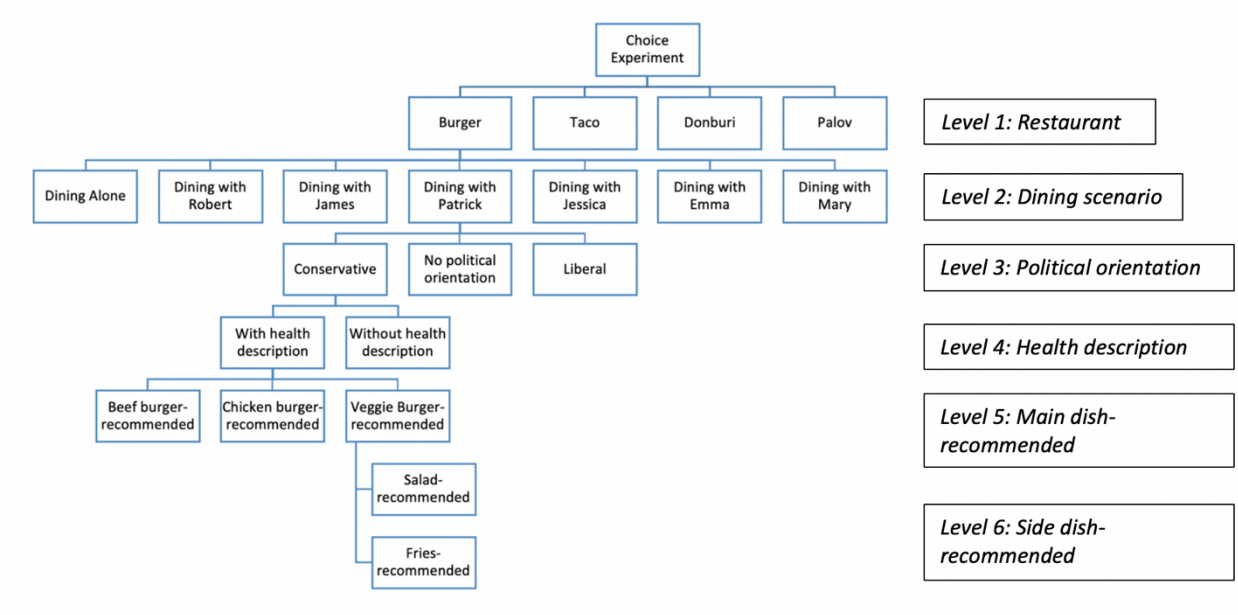

Figure 2.1. 2: Sample Choice Scenario

You are eating at a burger restaurant with your friend Patrick. Patrick has been travelling for the past month and has brought you some souvenirs. He shares some funny stories from his travels. He visited many attractions on foot, which felt as exhausting as the hour he usually spends in the gym every day. Patrick also recommends a book that he read during the vacation that seemed to have a strong conservative viewpoint and said he attended some political rallies. Then you both take a look at the menu.

Lunch menu

Beef burger $10
All-beef patty, lettuce, tomato, onions and pickles.

Chicken burger $10
Chicken breast, lettuce, and tomato.

Vegetarian burger
$[12]
House made vegetable patty, lettuce, tomato, onions and pickles.

All orders come with a side of fries or a tossed salad.

Food is made to order and substitutions can be made.

After you talk with Patrick for a few minutes, the waiter comes to take your orders. Patrick orders the vegetarian burger and fries and recommends that you try them yourself. What do you order?

Select the burger you would order:
- Beef burger
- Chicken burger
- Vegetarian burger

Select the side you would order:
- Salad
- Fries

Figure 2.1. 3: Sample Choice Scenario 2

You are having a meal with your friend Jessica at a donburi restaurant. You've been friends with Jessica for some time and know that she is generally quite liberal and is very concerned about her health. You ask Jessica what is new in her life, and she brings you up-to-date on what she has been doing. Then you both take a look at the menu.

Lunch menu

Gyu donburi $10
Beef and onions in a sweet sauce, served over rice.

Chicken karage donburi $10
Soy marinated chicken, served over rice with Japanese pickles.

Tofu donburi $8
Panko breaded fried tofu, shiitake mushrooms, and asparagus, served over rice.

Donburis are a Japanese rice bowl dish. The ingredients in the dish are simmered together and served over rice.

All orders come with a side of yam tempura or a salad (spring mix vegetables, cucumber slices, and tomatoes with soft white dressing).

Food is made to order and substitutions can be made.

You chat for a few minutes and the waiter comes to take your orders. Jessica orders the Tofu donburi and salad recommends that you try them yourself. What do you order?

Select the burger you would order:
- Gyu donburi
- Chicken karage donburi
- Tofu donburi

Select the side you would order:
- Salad
- Yam tempura

3.2.2 Efficient Design

Each treatment level of the scenario has different variables that make up the choice scenario. The distribution of these variables is designed by *Ngene*. *Ngene* is a software for designing discrete choice experiments and model type (Choice Metrics, 2018, p.9). For example, *Ngene* decides the dining companion's gender, political orientation, main dish and side dish recommendation, etc. The software *Ngene* is used to generate an *efficient design*. The *efficient design* is able to minimize the correlation in the data for estimation purposes and make standard errors be as small as possible for parameter estimates in the data (Choice Metrics, 2018, p.83).

The *efficient design* also allows putting constraints on the coding design, and constraints restrict food recommendation, dining companion's political orientation, gender, and health-consciousness in each scenario. Without constraints, the descriptions of the dining companion are conflict. For example, the scenario will be that "you are dining with a *female* companion, and *he* has a *conservative* viewpoint and supports the *liberal* party. *She* recommends a *beef* burger and a *chicken* burger to you". However, constraints will make this scenario as "you are dining with a *female* companion who has a *conservative* viewpoint. *She* recommends a *beef* burger to you".

In *efficient design*, there are 42 choice situations that are divided into 14 blocks, so each block has 3 choice tasks. The reason to use blocks is to avoid fatigue effects that participant is randomly given one block for each product category. The order of presentation and allocation of the different choice tasks to respondents are random (Peschel et al., 2016, p.82). Moreover, in order to make sure that each respondent has the scenario of dining alone, the case of dining alone is added into each block manually. Thus, each block has 4 choice tasks. Therefore, each respondent will be put into a burger/taco/donburi/palov restaurant once and meet with a particular dining companion once.

The *efficient design* holds the type of multinomial logit model (MNL) but the choice probability is different (Choice Metrics, 2018, p.83). These are utility functions for vegetarian, beef, and chicken products used to generate the *efficient design* with βs is assumed to be zero:

$$U(veggie) = \beta_1 * recveg + \beta_2 * po + \beta_3 * gender + \beta_4 * veggie\ price + \beta_5 * health + \beta_6 * recside + \beta_7 * recveg * po + \beta_8 * recveg * gender \quad (3.2.2.1)$$

$$U(beef) = \beta_1 * recbeef + \beta_2 * po + \beta_3 * gender + \beta_4 * beef\ price + \beta_5 * health + \beta_6 * recside + \beta_7 * recbeef * po + \beta_8 * recbeef * gender \quad (3.2.2.2)$$

$$U(chicken) = \beta_1 * recchicken + \beta_2 * po + \beta_3 * gender + \beta_4 * chicken\ price + \beta_5 * health + \beta_6 * recside + \beta_7 * recchicken * po + \beta_8 * recchicken * gender \quad (3.2.2.3)$$

- $recveg/recbeef/recchicken$: In each scenario, whether this companion recommends the vegetarian/beef/chicken product; If the companion recommends vegetarian/beef/chicken, $recveg/recbeef/recchicken = 1$; otherwise, $recveg/recbeef/recchicken = 0$.
- po: The companion's political orientation. If the companion is liberal, $po = 1$; if the companion is conservative, $po = -1$; otherwise, $po = 0$.
- $gender$: The companion's gender who is male or female.
- $veggie\ price/beef\ price/chicken\ price$: The price of different products; Vegetarian price is from \$8 to \$12, and beef and chicken prices are fixed at \$10.
- $health$: The companion's health orientation. If the companion is health conscious, $health = 1$; otherwise, $health = 0$.
- $recside$: The recommendation of sides. If the dining companion recommends healthy side, $recside = 1$; otherwise, $recside = 0$.

3.3 Summary Statistics[2]

After completing the choice experiment, respondents are asked a series of questions about their political and health orientations, food values, attitudes to animal welfare, food neophobia, and the frequency of meat and meat substitute consumption. The last part questions are about demographic characteristics that involve gender, age, residence, household, dependents, education level, and income level. The purpose of the other section of the survey is to understand effects from different aspects of characteristics on food choice.

3.3.1 Demographic Characteristics

This survey has 803 completed respondents. There are 393 (48.94%) females and 400 (49.81%) males, and other respondents choose options of "prefer not to say" and "others". This distribution is similar to the distribution from Statistics Canada (2020). In 2019, Canadian population was 49.69% male and 50.3% female. The sample median age is 46-55 years old. The median age is older than the median age of population estimates in 2019 that is 40.8-year-old (Statistics Canada, 2020). The reason may be the survey bias, as the survey companies find it difficult to recruit young people.

[2] The questionnaire is attached in Appendix 3

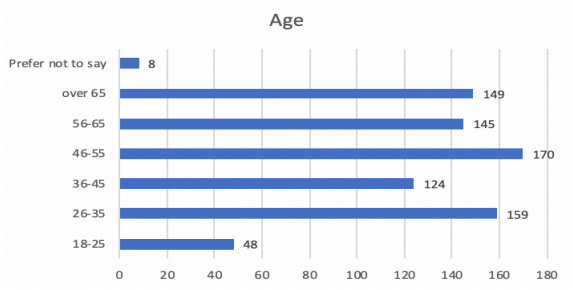

Figure 3.3.1. 1: Age Distribution

Respondents' education levels vary, and the median education level is "completed college or technical institute". Statistics Canada (2018) shows a similar median education level that is the postsecondary certificate or diploma. Moreover, among the working-age population, the percentage of the bachelor's degree is 17.2% (Statistics Canada, 2018), but the sample has 32.25% of respondents having completed a bachelor's degree. This may be due to the higher education level of the survey group.

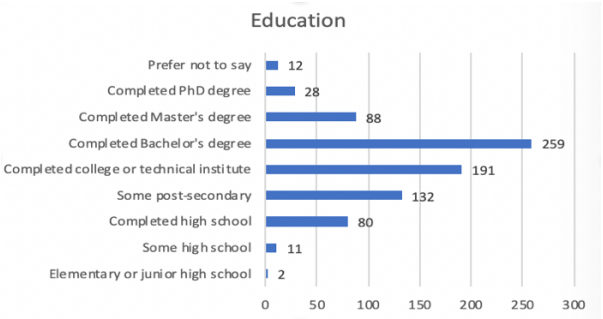

Figure 3.3.1. 2: Education Distribution

In the income distribution, there are 146 respondents (18.18%) choosing the option of "prefer not to say" for their income. Excluding those who "prefer not to say", the median income is $75,000-99,999. According to Statistics Canada (2020), in 2018, the median income is $61,400, so the income level is higher than the population. The relatively large group of income range are $100,000-$149,999 (19.05%) and $75,000-$99,999 (16.19%).

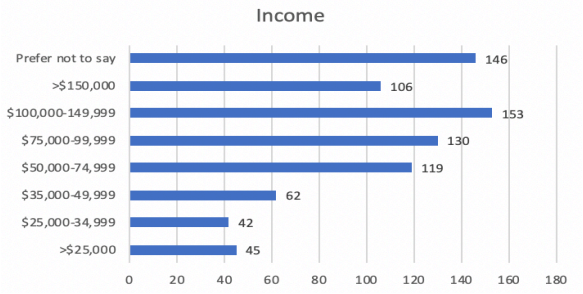

Figure 3.3.1. 3: Income Distribution

Respondents are distributed across Canada, except Nunavut. Ontario has the largest group of respondents (45.95%). British Columbia and Alberta have similar numbers of respondents that are around 15%. Additionally, a large proportion of respondent (77.58%) living in urban areas, compared with 22.42% of respondents who live in rural areas.

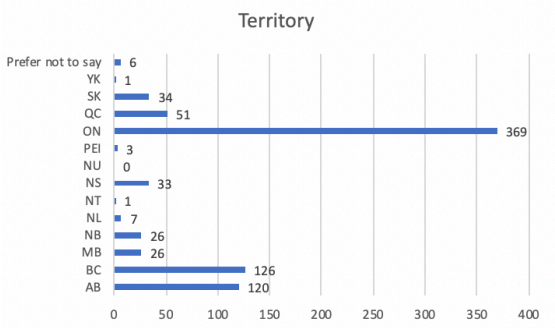

Figure 3.3.1. 4: Territory Distribution

3.3.2 Political Orientation: Social and Economic Conservatism

Respondents were asked to select the best description of their political orientation from very conservative, conservative, centrist, liberal, and very liberal. In the distribution of the political orientation, the most common political orientation is liberal (32.63%), compared with the conservative group (27.52%) and centrist (31.13%); otherwise, 4.11% of respondents choose very conservative whereas 4.61% of respondents choose very liberal.

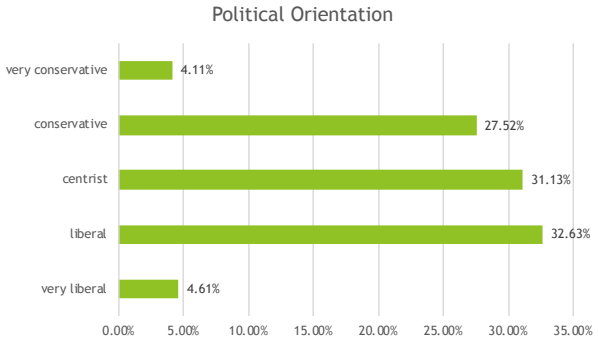

Figure 3.3.2. 1: Political Orientation Distribution

We also measure political orientation using responses to eight items from Everett's (2013) Social and Economic Conservatism Scale (SECS) (p.1). These items are family unit, religion, social values, law enforcement, limited government, business, welfare, and fiscal responsibility. Descriptions are in *Appendix 3*, and the first four items represent social conservatism, and others are economic conservatism.

- A traditional family unit with a father and mother is the ideal environment for a child;
- Religion has a positive effect on society;
- Social values are changing too quickly;
- I have great respect for law enforcement;
- The size of government ought to be kept as small as possible;
- Large corporations do more harm than good;
- Government ought to increase funding for social programs;
- It is important for government to reduce the national debt.

Among 803 respondents, 81.94% of them relatively pay attention to politics. Compared to 31.63% of respondents choosing the conservative and very conservative political orientations, 55.29% of them are economic conservative, and 49.19% are social conservative. There are 37.24% of respondents choosing the liberal and very liberal political orientations, but only 3.36% of them choosing economic liberal and 11.71% choosing social economic. Therefore, as *Table 3.2.1* shows, correlations between political orientation and social/economic conservatism are not strong.

Table 3.3.2. 1: Correlation between the political orientation, attention of politics, and social and economic conservatism

	Liberal	Political attention	Economic liberal	Social liberal
Liberal	1			
Political attention	0.0462	1		
Economic liberal	-0.0290	-0.0854	1	
Social liberal	0.3531	-0.0405	0.2664	1

According to *Table 3.2.1*, the correlation between liberal and political attention is weak, so liberals might not pay too much attention to politics. Liberal has a positive correlation with social liberals but has a weak and negative correlation with economic liberals. Therefore, liberals are not economic liberals but maybe social liberals.

3.3.3 Health Awareness

Respondents are given six statements related to eating habits. For example, I eat a healthy diet. Respondents choose how much they agree or disagree with three statements of healthy eating habits, and the scale from strongly disagree to strongly agree is 1 to 5. There are three statements of unhealthy eating habits, and the scale of these statements from strongly disagree to

strongly agree is 5 to 1. In order to measure respondents' health awareness, we calculated respondents' average choice scales. For instance, if the respondent chooses "strongly agree" for three healthy statements and for the other three unhealthy statements, this respondent's average choice scale will be three points, indicating this respondent has neutral health awareness. Moreover, if respondents' average choice scales are four points/five points, they are assumed to be healthy/very healthy. There are 45.8% of respondents having healthy consciousness, and 13.0% of respondents having unhealthy and very unhealthy consciousness.

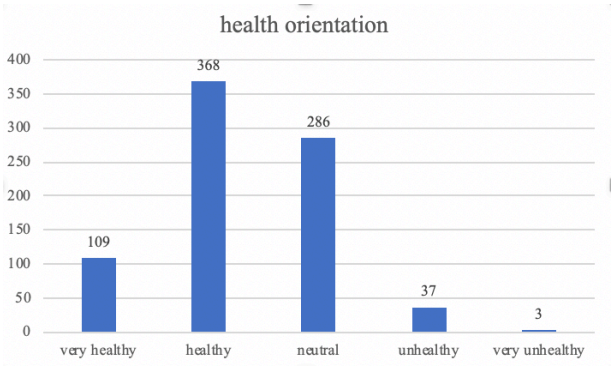

Figure 3.3.3. 1: Health Awareness Distribution

3.3.4 Consumption of Meat and Meat Substitutes and Attitudes to Animal Welfare and Food Neophobia

Respondents were asked to select how much they agree or disagree with statements about concerns of animal welfare and food neophobia. For instance, "I prefer familiar and safe foods", or "I do not trust novel foods". The continuous scales of animal welfare and food neophobia come from the average of respondents' choices. 312 respondents (38.85%) are neutral about animal welfare, while 155 respondents (19.30%) are concerned about animal welfare. Almost half of the respondents (47.32%) have a medium food neophobia scale, and 22.29% of respondents have high or very high food neophobia.

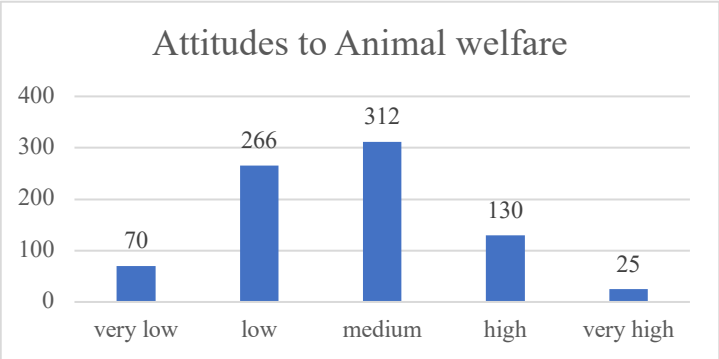

Figure 3.3.4. 1: Attitudes to Animal Welfare

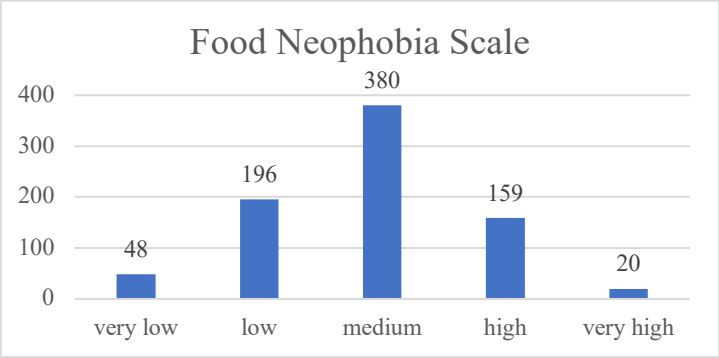

Figure 3.3.4. 2: Food Neophobia Scale

The two most common frequencies of meat consumption are "1 to 2 times per day" (46.45%) and "at least once a week, but less than once a day" (41.49%). However, in the meat substitute consumption, around 42.27% of respondents never consume meat substitutes, and 21.79% consume meat substitutes less than once a month. Compared with meat consumption, the consumption of meat substitute is much lower.

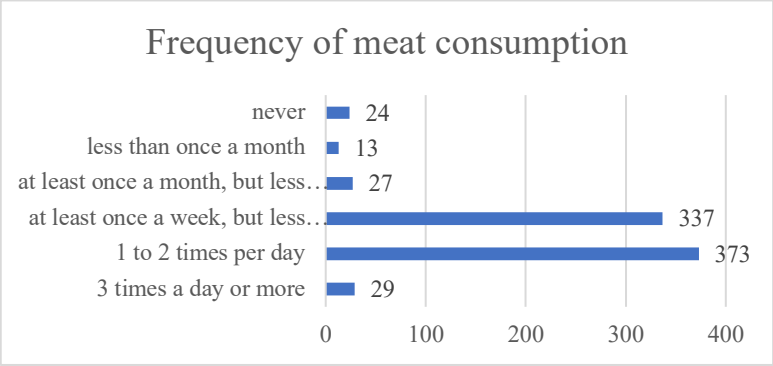

Figure 3.3.4. 3: Frequency of Meat Consumption

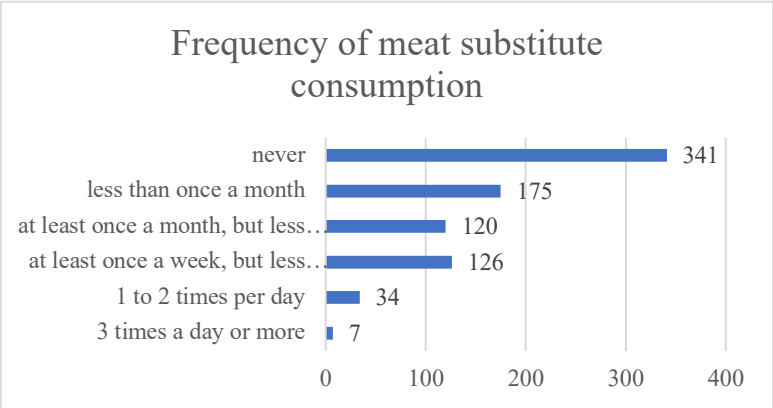

Figure 3.3.4. 4: Frequency of Meat Substitute Consumption

Table 3.4.1 shows the correlation between the frequency of meat and meat substitute consumption, animal welfare, and food neophobia scale (FNS). Animal welfare has a negative correlation with the frequency of meat consumption and a positive correlation with the frequency of meat substitute consumption. This correlation is consistent with the opinion that people who care more about animal welfare consume fewer meats and shift to more meat substitutes. Food neophobia has a weak positive correlation with the frequency of meat consumption and a negative correlation with the frequency of meat substitute consumption.

Table 3.3.4. 1: Correlation between Consumption of Meat and Meat Substitutes and Attitudes to Animal Welfare and Food Neophobia

	Meat	PBPs	Animal welfare	FNS
Meat	1			
PBPs	-0.0604*** [3]	1		
Animal welfare	-0.2565***	0.2358***	1	
FNS	0.0334*	-0.2021***	0.0616***	1

3.3.5 Food Values

Respondents were asked to rank the five food values that are the most important to them from a list of 12 values (naturalness, taste, price, safety, convenience, nutrition, tradition, origin, fairness, appearance, environmental impact, and animal welfare). Relatively more people (23.54%) choose taste as the first and the most important food value. When 19.80% of the respondents choose safety as the most important food value, nutrition is selected as 19.55%. This

[3] *** is 1% critical value
** is 5% critical value
* is 10% critical value

result is consistent with findings from Lusk and Briggeman (2009), but the order is different. In their research, safety is the most important food value, and nutrition, taste, and price are the next most important food values (Lusk and Briggeman, 2009, p.191). It's uncertain whether the difference is statistically or economically significant.

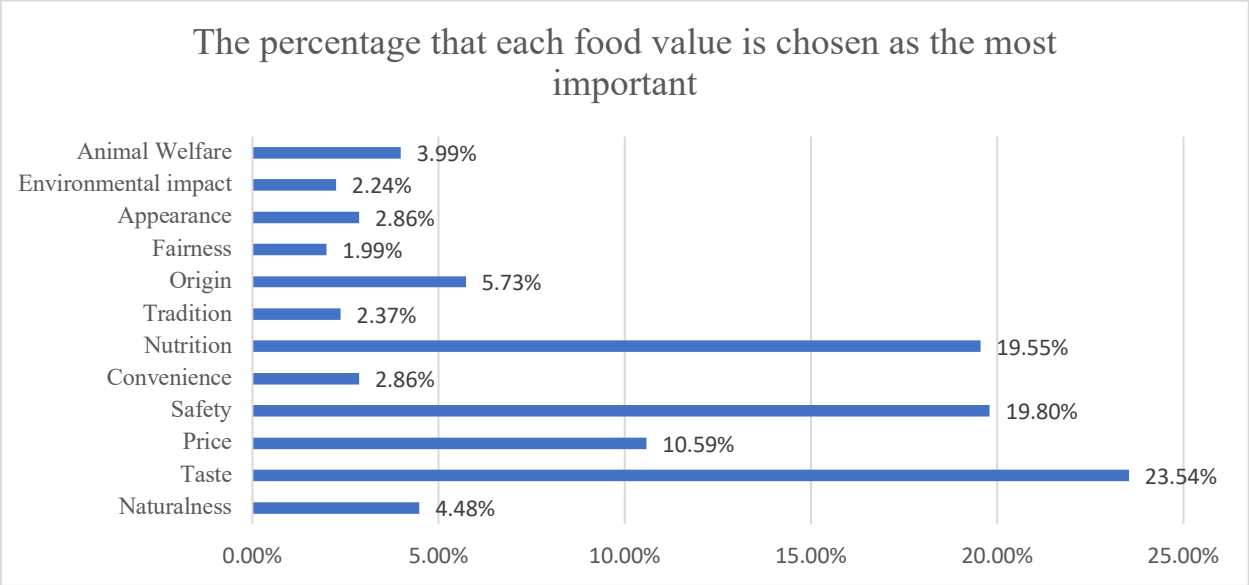

Figure 3.5.5. 1: The percentage that each food value is chosen as the most important

Chapter 4—Methodology

The choice experiment (CE) method is a stated preference elicitation technique that investigates consumer preferences for various attributes related to the survey products (Kikulwe et al., 2011, p.548). The CE model is the theoretical model of consumer choice that consumers' satisfaction derives from the goods' attributes instead of goods themselves. For example, in the attribute-based choice experiments, respondents are presented with a set of product choice alternatives that are described in terms of product attributes. Respondents' preferred product choices allow attribute preferences to be revealed without asking participants directly about their subjective valuation of specific product attributes (Peschel et al., 2016, p.81). The CE model has an econometric basis in models of random utility that have the integration of behavior with economic valuation (Kikulwe et al., 2011, p.549). The utility function and probability function will be discussed in the following section.

The CE has several advantages over other valuation methods (Holmes, Adamowicz, and Carlsson, 2017, p.2). For example, according to Holmes, Adamowicz, and Carlsson (2017), the experimental design can use smaller samples because the experimental design theory gains the statistical efficiency of the estimated parameters and can decrease implementation costs (p.2). Also, the CE provides a relatively easy presentation format to respondents, and researchers can design attributes and their levels to make them realistic to respondents, such as similar conditions that respondents may face in markets (Holmes, Adamowicz, and Carlsson, 2017, p.2).

However, CE is a controversial label because it could be "attribute-based methods", "attribute based stated choice methods", "choice based conjoint analysis", etc (Holmes, Adamowicz, and Carlsson, 2017, p.90). Therefore, the label "discrete choice experiment" is recommended by Carson and Louviere (2011, p.542) that shows these choice experiments "elicit a discrete response to an experimentally designed set of choice alternatives" (Holmes, Adamowicz, and Carlsson, 2017, p.90). Discrete Choice Experiments (DCE) are a way to overcome reliability concerns with purchase intention scales because, in DCE, researchers are allowed to estimate the influences that discrete attributes have on consumer choice (Jarvis,

Mueller, and Chiong, 2010, p.139). For instance, if the consumer has to choose between beef, chicken, and vegetable, the DCE will estimate the effects from attributes of these three food products on consumer food choices. A typical DCE consists of a set of designed choice scenarios or tasks based on predetermined attributes and displayed levels to respondents. This thesis has three choices that are beef, chicken, and vegetarian products. In DCE, consumers' responses can be estimated "the part-worth utilities of each attribute level that have a direct relationship with the choice probability of any combination of alternatives" (Jarvis, Mueller, and Chiong, 2010, p.139). DCEs are advantageous to permit the simulation of any choice situation, and the reason is the preference data is included in a probabilistic choice model.

The methodology section presents the theoretical framework, models of the main dish choice, and models of the side dish choice. The theoretical framework introduces the random utility theory, binary logit regression model, and the multinomial logit model. The main dish choice uses the multinomial logit model, and side dish choice adopts the binary logit model. This section exhibits the utility functions of these models.

4.1 Theoretical Framework

4.1.1 Random Utility Theory

In a choice experiment, an extension of the random utility maximization (RUM) model is the basis of the analysis of responses. The CE focuses the respondent's reactions on the trade-offs between implicit attributes in the choice processing. Model estimates use the utility differences between alternatives in choice sets (Holmes, Adamowicz, and Carlsson, 2017, p.33).

Random Utility Theory can explain consumer preferences observed in purchase simulation. This theory assumes individuals prefer the alternatives with the highest perceived utility (Stolz et al., 2011, p.773), and "choices made among alternatives will be a function of the probability that the utility associated with a particular option is higher than that associated with other alternatives" (Kikulwe et al., 2011, p.549). The individual k chooses alternative i from alternative sets N only when this alternative i contains the highest perceived utility U_{ki}, and P_{ki} is the probability that the individual k will select the alternative i from the set N.

$$P_{ki} = P(U_{ki}) > P\left(U_{kj}\right) for\ all\ i \neq j \qquad (4.1.1.1)$$

RUM is based on the assumption that consumers know their utility, but researchers cannot perfectly observe respondent utility (Holmes, Adamowicz, and Carlsson, 2017, p.33). Hence, the utility of choice consists of a deterministic component and an error component that

follows a predetermined distribution and does not depend on the deterministic part. The error term has implied that the prediction could not be made certain (Kikulwe et al., 2011, p.549). Utility U_{ki} has two parts:

$$U_{ki} = \beta x_{ki} + \varepsilon_{ki} \quad (4.1.1.2)$$

ε_{ki} is the unobserved variation and is the random error with zero mean;
βx_{ki} is generated by attributes, so it's the systematic and measurable part of the utility function (Stolz et al., 2011, p.773).
The following binary logit model and multinomial logit model are consistent with the Random Utility Theory.

4.1.2 Binary Logit Regression Model

Among the techniques of regression analysis, logistic regression modeling is one of the most widely used. The binary logit model has the binary outcome y_i, where $i = 1,2, \dots, N$, and N denotes the total number of observations. This binary outcome y_i has 0 or 1 values showing the happening or absence of the event, like "yes" or "no" of the choice (Lipovetsky, 2015, p.38). The probability of "yes" can be estimated by the logistic model:

$$P_{(y_i = 1|\beta)} = \frac{\exp(x_i\beta)}{1+\exp(x_i\beta)} \quad (4.1.2.1)$$

P is the conditional probability of the event $y_i = 1$ subject to x_i value, and the probability of the absence of the event or "no" choice is $1 - P$. The x_i is a row vector of regressors. β is an unknown regression parameter of dimension d, and if β is assumed to be known on condition, the observations will be mutually independent (Frühwirth-Schnatter and Frühwirth, 2010, p.113). This thesis uses the binary logit model to analyze the choice of healthy foods. If the respondent k chooses the healthy food, $y_i = 1$; otherwise, $y_i = 0$. Details are in the part of Model of Side Dish Choice.

4.1.3 Multinomial Logit (MNL) Model

In the main choice, there are three choices in the main dish: vegetarian, beef, and chicken products. The binary logit model is not appropriate due to the non-binary dependent variables in this model. The multinomial logit model has simultaneous estimation as the binary logit for all alternatives, but, in each case, one of the alternatives is the base outcome (comparison group) (Stolz et al., 2011, p.744).

A multinomial logit (MNL) model is an econometric model that connects random utility

maximization and hedonic analysis of alternatives (Holmes, Adamowicz, and Carlsson, 2017, p.5). MNL model is a logistic distribution that bases on the results of differences between two Gumbel distributions. The type 1 extreme value (Gumbel) distribution with the standard assumption has the independently and identically distributed (IID) errors. MNL model has two important properties: the alternatives are all independent, and, among respondents, the modeling of taste variation is limited (Holmes, Adamowicz, and Carlsson, 2017, p.37).

One choice set contains N alternatives that (i=1, …, N) in the choice experiment. When errors have the type 1 extreme value distributions, the MNL model's probability of respondent k choosing alternative i is:

$$P_{ik} = \frac{\exp(\mu U_{ki})}{\sum_{j=1}^{N} \exp(\mu U_{kj})} \quad (4.1.3.1)$$

μ is the scale parameter that shows the variance of the unobserved part's utility, and it's typically set equal to 1 (Holmes, Adamowicz, and Carlsson, 2017, p.37).

This MNL model has a well-behaved likelihood function, and it is useful to estimate by maximum likelihood for alternative sets N, almost for any size of sampling (McFadden, 1987, p.63). However, MNL model has two limits. The first one is the IID assumption of the error terms that causes the independent irrelevant alternatives (IIA) property, so the MNL model assumes that all individuals from the sample have the same level of importance on each alternative (Lusk and Briggeman, 2009, p.189). The second one is the unobserved heterogeneity. Due to IID error term, the MNL severely limits unobserved heterogeneity (Holmes, Adamowicz, and Carlsson, 2017, p.39).

4.2 Model of Main Dish Choice

In each choice scenario, there are three choices for the main dish: vegetarian, beef, and chicken. I, therefore, use the MNL model. In the MNL model, the chicken choice is the base outcome. In each case, the recommended product is different and could be chicken, beef, or vegetarian randomly. For example, if the scenario recommends a vegetarian product, vegetarian recommendation will be 1, and the recommendations of chicken and beef will be 0. And each case has the same political orientation and gender. Therefore, when running regression, the chicken choice (base outcome) only shows the results of the recommendation and its interaction terms.

The important variables in the main dish choice are the recommendation, political orientation, and gender. The food recommendation is the menu item that the dining companion recommends in the choice scenario. Gender is from the demographic characteristics, and respondents can choose their gender as male, female, other, or prefer not to say. Political orientation is from survey questions. The question asks respondents to select the best description of their political orientation from very conservative to very liberal.

This section has four models: model without the interaction of the dining companion, two models with the interaction of the dining companion, and the model of familiar and unfamiliar foods. Models with the interaction of the dining companion also display the marginal effects.

4.2.1 Model without Interaction of the Dining Companion

When dining with others, individuals' choices could be affected by the dining companion's gender, political orientation, or other characteristics. This model is without the interaction terms of the dining companion and tests whether the gender, political orientation, and the recommendation affect food choices. These are utility functions and the probability of the respondent k choosing the vegetarian, beef, and chicken products.

$$U_{veggie_k} = \beta_1 * veggie\ price + \beta_2 * rec_{veg_k} + \beta_3 * Liberal_{R_k} + \beta_4 * Female_{R_k} + \varepsilon_{k1} \quad (4.2.1.1)$$

$$U_{beef_k} = \beta_5 * rec_{beef_k} + \beta_6 * Liberal_{R_k} + \beta_7 * Female_{R_k} + \varepsilon_{k2} \quad (4.2.1.2)$$

$$U_{chicken_k} = \beta_8 * rec_{chicken_k} + \beta_9 * Liberal_{R_k} + \beta_{10} * Female_{R_k} + \varepsilon_{k3} \quad (4.2.1.3)$$

$$pr(y = veggie\ choice) = \frac{\exp(U_{veggie})}{\exp(U_{beef}) + \exp(U_{chicken}) + \exp(U_{veggie})} \quad (4.2.1.4)$$

$$pr(y = beef\ choice) = \frac{\exp(U_{beef})}{\exp(U_{beef}) + \exp(U_{chicken}) + \exp(U_{veggie})} \quad (4.2.1.5)$$

$$pr(y = chicken\ choice) = \frac{\exp(U_{chicken})}{\exp(U_{beef}) + \exp(U_{chicken}) + \exp(U_{veggie})} \quad (4.2.1.6)$$

- Vegetarian Price is the price of the vegetarian products. The reason why only the utility function of vegetarian has the vegetarian price is that the price of vegetarian products is random from \$8 to \$12, but the price of chicken or beef products is fixed at \$10.
- Rec_{veg}/rec_{beef}/$rec_{chicken}$ is the food recommendation. If the scenario recommends the vegetarian/beef/chicken product, rec_{veg}/rec_{beef}/$rec_{chicken}$=1 (only one product is recommended in each scenario); otherwise=0.

- $Liberal_{R_k}$ is the respondent's political orientation. If the respondent is very liberal and liberal/centrist/conservative and very conservative, $Liberal_{R_k} = 1/0/-1$.
- $Female_{R_k}$ is the respondent's gender. If respondent are female or those who choose "prefer not to say" or "other", $Female_{R_k} = 1$, and if the respondent is male, $Female_{R_k} = 0$.

4.2.2 Model with Interaction Terms

This model is similar to the previous model but contains the dining companion's gender and political orientation and the interactions with the recommendation. These interactions examine whether the recommendation from others who have the same social identities has stronger effects on food choices. *S* denotes the dining companion, and *R* is the respondent.

$$U_{veg_k} = \beta_{11} * veggie\ price + \beta_{12} * rec_{veg_k} + \beta_{13} * Liberal_{R_k} + \beta_{14} * Liberal_{S_k} + \beta_{15} * rec_{veg_k} * Liberal_{R_k} + \beta_{16} * rec_{veg_k} * Liberal_{S_k} + \beta_{17} * Liberal_{R_k} * Liberal_{S_k} + \beta_{18} * rec_{veg_k} * Liberal_{R_k} * Liberal_{S_k} + \beta_{19} * Female_{R_k} + \beta_{20} * Female_{S_k} + \beta_{21} * rec_{veg_k} * Female_{R_k} + \beta_{22} * rec_{veg_k} * Female_{S_k} + \beta_{23} * Female_{R_k} * Female_{S_k} + \beta_{24} * rec_{veg_k} * Female_{R_k} * Female_{S_k} + \varepsilon_{k4} \quad (4.2.2.1)$$

$$U_{beef_k} = \beta_{25} * rec_{beef_k} + \beta_{26} * Liberal_{R_k} + \beta_{27} * Liberal_{S_k} + \beta_{28} * rec_{beef_k} * Liberal_{R_k} + \beta_{29} * rec_{beef_k} * Liberal_{S_k} + \beta_{30} * Liberal_{R_k} * Liberal_{S_k} + \beta_{31} * rec_{beef_k} * Liberal_{R_k} * Liberal_{S_k} + \beta_{32} * Female_{R_k} + \beta_{33} * Female_{S_k} + \beta_{34} * rec_{beef_k} * Female_{R_k} + \beta_{35} * rec_{beef_k} * Female_{S_k} + \beta_{36} * Female_{R_k} * Female_{S_k} + \beta_{37} * rec_{beef_k} * Female_{R_k} * Female_{S_k} + \varepsilon_{k5} \quad (4.2.2.2)$$

$$U_{chicken_k} = \beta_{38} * rec_{chicken_k} + \beta_{39} * Liberal_{R_k} + \beta_{40} * Liberal_{S_k} + \beta_{41} * rec_{chicken_k} * Liberal_{R_k} + \beta_{42} * rec_{chicken_k} * Liberal_{S_k} + \beta_{43} * Liberal_{R_k} * Liberal_{S_k} + \beta_{44} * rec_{chicken_k} * Liberal_{R_k} * Liberal_{S_k} + \beta_{45} * Female_{R_k} + \beta_{46} * Female_{S_k} + \beta_{47} * rec_{chicken_k} * Female_{R_k} + \beta_{48} * rec_{chicken_k} * Female_{S_k} + \beta_{49} * Female_{R_k} * Female_{S_k} + \beta_{50} * rec_{chicken_k} * Female_{R_k} * Female_{S_k} + \varepsilon_{k6} \quad (4.2.2.3)$$

$$pr(y = veggie\ choice) = \frac{\exp(U_{veggie})}{\exp(U_{beef}) + \exp(U_{chicken}) + \exp(U_{veggie})} \quad (4.2.2.4)$$

$$pr(y = beef\ choice) = \frac{\exp(U_{beef})}{\exp(U_{beef}) + \exp(U_{chicken}) + \exp(U_{veggie})} \quad (4.2.2.5)$$

$$pr(y = chicken\ choice) = \frac{\exp(U_{chicken})}{\exp(U_{beef}) + \exp(U_{chicken}) + \exp(U_{veggie})} \quad (4.2.2.6)$$

This model is similar to the *Model (1)* but adds socio-demographic characteristics and food values to the utility equations, such as education level, income level, animal welfare, food neophobia, taste, nutrition, and safety.

Descriptions of variables in the utility equations:

- *income* is the respondent's income level. $income = 0,1, \dots ,7$: if the respondent chooses "prefer not to say", $income = 0$; otherwise, with one level increase of the income, *income* increases by one-unit.
    - Also, because 18.18% of respondents choose "prefer not to say", I generate a dummy variable called $income_{prefer\ not\ to\ say}$. If the respondent chooses "prefer not to say", $income_{prefer\ not\ to\ say} = 1$; otherwise, $income_{prefer\ not\ to\ say} = 0$.
- *educ* is the respondent's education level. $educ = 0,1, \dots ,8$: if the respondent chooses "prefer not to say", $educ = 0$; otherwise, with one level increase of the education level, *educ* increases by one-unit.
    - Also, in order to make the education level be consistent with income level, I generate a dummy variable called $educ_{prefer\ not\ to\ say}$. If the respondent chooses "prefer not to say", $educ_{prefer\ not\ to\ say} = 1$; otherwise, $educ_{prefer\ not\ to\ say} = 0$.
- *FNS* is the respondent's food neophobia scale. $FNS = 1,2, \dots ,5$, and the scale is from low to high.
- *animalwelfare* is concerns about the animal welfare. $animalwelfare = 1,2, \dots ,5$, and the level of concerns is from low to high.
- *safety*: if the respondent chooses safety as the most important food value, $safety = 1$; otherwise, $safety = 0$.
- *nutrition*: if the respondent chooses nutrition as the most important food value, $nutrition = 1$; otherwise, $nutrition = 0$.
- *taste*: if the respondent chooses taste as the most important food value, $taste = 1$; otherwise, $taste = 0$.

4.2.3 Model of Familiar and Unfamiliar Foods

The choice experiment has four restaurants: burger, taco, donburi, and palov. Burger and taco represent familiar foods. Donburi and palov are unfamiliar foods to consumers because

pilot results show that around 75% of respondents are unfamiliar with the palov, and 72% are unfamiliar with donburi. This MNL model tests whether the recommendation of familiar or unfamiliar foods has effects on food choices and controls the type of restaurant. The utility equations contain the type of restaurant and interactions between the restaurant and the food recommendation.

4.3 Model of Side Dish Choice

The model of side dish choice examines factors that influence healthy food choices. A healthy food (salad) and unhealthy food (fries, onion rings, etc.) are two options of the side dish; in other word, the option is choosing healthy food or not. Therefore, side dish choice uses the binary logit model. This section has two models: one is the model without the interaction with the dining companion, and the other is the model with the interaction with the dining companion.

The model contains some critical variables that are the same as models of the main dish choice, such as recommendation, gender, education level, and income level. The health-consciousness is also an important variable. In survey questions, respondents need to choose how much they agree or disagree with statements relative to diet habits (*See Appendix of the Survey Questions: C1*).

4.3.1 Model without the Interaction with the Dining Companion

The model without the interaction with the dining companion tests whether the recommendation, health consciousness, gender, education, and income level impact the choice of healthy foods.

$$U_{healthyside} = \beta_{51} + \beta_{52} * rec_{healthside} + \beta_{53} * health_R + \beta_{54} * Female_R + \beta_{55} * educ_R + \beta_{56} * educ_{R_{prefer\ not\ to\ say}} + \beta_{57} * income_R + \beta_{58} * income_{R_{prefer\ not\ to\ say}} + \sigma_1 \quad (4.3.1.1)$$

$$pr(y = healthy\ side) = \frac{\exp(U_{healthyside})}{1 + \exp(U_{healthyside})} \quad (4.3.1.2)$$

- $rec_{healthside}$ is the recommendation of the healthy side dish. If the salad (the healthy side dish) is recommended, $rec_{healthside} = 1$; otherwise, $rec_{healthside} = 0$.
- $health_R$ is the respondent's health-consciousness. $health_R = -2, -1, 0, 1, 2$: $health_R = -2$ is the lowest health-consciousness while $health_R = 2$ is the highest health-consciousness. With one level increase of the health-consciousness, $health_R$ increases by one-unit.

- $Female_R$ is the respondent's gender. If respondents are female or those who choose "prefer not to say" or "other", $Female_R = 1$, and if the respondent is male, $Female_R = 0$.
- *educ* is the respondent's education level. $educ = 0,1, \dots ,8$: if the respondent chooses "prefer not to say", $educ = 0$; otherwise, with one level increase of the education level, *educ* increases by one-unit.
    - Also, because 1.49% of respondents choose "prefer not to say", I generate a dummy variable called $educ_{prefer\ not\ to\ say}$. If the respondent chooses "prefer not to say", $educ_{prefer\ not\ to\ say} = 1$; otherwise, $educ_{prefer\ not\ to\ say} = 0$.
- *income* is the respondent's income level. $income = 0,1, \dots ,7$: if the respondent chooses "prefer not to say", $income = 0$; otherwise, with one level increase of the income, *income* increases by one-unit.
    - Also, because 18.18% of respondents choose "prefer not to say", I generate a dummy variable called $income_{prefer\ not\ to\ say}$. If the respondent chooses "prefer not to say", $income_{prefer\ not\ to\ say} = 1$; otherwise, $income_{prefer\ not\ to\ say} = 0$.

4.3.2 Model with the Interaction with the Dining Companion

This model has similar hypotheses to the model with the interaction in the main dish choice. Interaction terms assess whether the recommendation from the same gender or health awareness group has stronger effects on healthy food choices.

$$U_{healthyside} = \beta_{58} + \beta_{59} * rec_{healthside} + \beta_{60} * health_R + \beta_{61} * health_S + \beta_{62} * rec_{healthside} * health_R + \beta_{63} * rec_{healthside} * health_S + \beta_{64} * health_s * health_R + \beta_{65} * rec_{healthside} * health_R * health_S + \beta_{66} * Female_R + \beta_{67} * Female_S + \beta_{68} * rec_{healthside} * Female_R + \beta_{69} * rec_{healthside} * Female_S + \beta_{70} * Female_R * Female_S + \beta_{71} * rec_{healthside} * Female_R * Female_S + \beta_{72} * Educ_R + \beta_{73} * educ_{R_{prefer\ not\ to\ say}} + \beta_{74} * ncome_R + \beta_{75} * income_{R_{prefer\ not\ to\ say}} + \varepsilon \quad (4.3.2.1)$$

$$pr(y = healthy\ side) = \frac{\exp(U_{healthyside})}{1 + \exp(U_{healthyside})} \quad (4.3.2.2)$$

- $health_s$ is the dining companion's health awareness. If the companion has the description of health, $health_s = 1$; otherwise, $health_s = 0$.
- $Female_S$ is the dining companion's gender. If the companion is female, $Female_S = 1$; otherwise, if the dining companion is male, or the scenario is dining alone, $Female_S = 0$.

4.4 Marginal Effects

Marginal effects estimate the change in y that is caused by a one-unit change x_k (Williams, 2012, p.323). This thesis uses the marginal effects at the means (MEM). The MEM calculates the marginal effect of each variable for each observation when keeping covariates at their means. For example, if the x_k is a categorical variable has values 0 and 1, holding all other variables at their means, the change of $p(y = 1)$ will be (Williams, 2019):

$Marginal\ effect\ x_k = p(y = 1|x, x_k = 1) - p(y = 1|x, x_k = 0)$

(Discussions of the calculation are in *Appendix 4*)

Chapter 5—Results

Chapter 5 shows the results of the regression models from Chapter 4. This chapter includes two parts. The first part displays the regression results of the main dish choice models. The main dish choice has two models, and results show that these models have different significant variables but have similar marginal effects. The second part presents the side dish choice models' results, and the results of side dish choice models also have different significant variables in different models.

5.1 Model of Main Dish Choice

5.1.1 Model without Interaction of the Dining Companion

As *Table 5.1.1* shows, in the model without the interaction, the recommendation of chicken, vegetarian, and beef products is significant with positive coefficients, so people are more likely to choose chicken, vegetarian, or beef products when they are recommended. Gender is significant at beef and vegetarian choice, but the coefficient of beef is negative and positive in vegetarian choice. Therefore, relative to chicken, women are more likely to choose vegetables, but men are more likely to choose beef. Political orientation is only significant for the vegetarian choice with a positive coefficient, so, relative to chicken, liberals prefer vegetarian proteins.

Table 5.1. 1: Results of the Main Dish Choice Model without Interaction

	Variable	**Coefficient**
Chicken	Recommended chicken	0.237 (0.082)***
Beef	Recommended beef	0.150 (0.086)*
	Liberal (respondent)	-0.0533 (0.056)
	Female (respondent)	-0.500 (0.092)***
Vegetarian	Vegetarian price	0.00359 (0.034)
	Recommended vegetarian	0.258 (0.10)**
	Liberal (respondent)	0.203 (0.083)**
	Female (respondent)	0.326 (0.14)***
(Std. Err. adjusted for 803 clusters in survey respondents)		
Number of obs = 9,636		
Log pseudolikelihood = -3252.5463	Pseudo R2 = 0.0783	
Wald chi2(10) = 266.23	Prob > chi2 = 0.0000	

*** 1% critical value

** 5% critical value
* 10% critical value

Table 5.1.2 displays the marginal effects of the model without Interaction Terms. In this model, the signs of the marginal effects of variables are the same as the regression results. For example, the recommendation has positive marginal effects on beef and vegetarian choices. Compared with non-recommendation, people are 2.97% (6.36%) more likely to choose beef (vegetarian) products when products are recommended. Also, women have a 7.71% higher probability of choosing vegetarian proteins but a 9.84% lower probability of choosing beef products than men. Liberals are 4.97% more likely to select vegetarians and 0.999% less likely to choose beef than centrists.

Table 5.1. 2: Marginal Effects of the Model without Interaction Terms

	Beef	**Vegetarian**
$recommendation$	.0297 (0.018)*	.0636 (0.027)**
$Liberal_R$	-.00999 (0.010)	.0497 (0.021)**
$Gender_R$	-.0984 (0.018)***	.0771 (0.034)**

5.1.2 Model with Interaction Terms

Some significant variables are the same as the model without interaction terms, such as the respondent's gender in beef and vegetarian choices, chicken recommendation, and the respondent's political orientation in the vegetarian choice. But, the recommendation of beef and vegetarians is not significant, so individuals are not affected by the recommendation on choices of beef and vegetables in this model.

One interesting finding is that the interaction between recommendation and the companion's political orientation is significant with a negative coefficient in the vegetarian choice. This means that individuals are more likely to choose vegetarian protein when a conservative companion recommends it.

As the highlighted interaction terms show, the regression result of that recommendation with the interaction of the political orientation/gender between the respondent and the dining companion is not significant. Therefore, the hypothesis that the recommendation from the dining companion from the same political orientation/gender group has a stronger effect on food choices is not accepted. This result means that the recommendation has the same effect, regardless of whether the recommender has the same or different social identities as others. For example, a

woman recommends a man to try a beef burger, but this man may not accept this recommendation and choose other foods.

Therefore, food recommendation plays a positive role in food choices, and the recommender from a certain social identity, like the conservative party, also has effects on food choices. However, as more recommender's descriptions are given, the effect of recommendation is not strong.

Table 5.1. 3: Model (1) Regression Results

	Beef	**Chicken**	**Vegetarian**
Recommended beef/chicken/vegetarian	0.0286 (0.17)	0.318 (0.14)**	0.205 (0.24)
Liberal (respondent)	-0.0200 (0.072)		0.202 (0.098)**
Liberal (companion)	-0.125 (0.096)		0.0524 (0.099)
Liberal (interaction)	0.0141 (0.10)		-0.0758 (0.11)
Female (respondent)	-0.508 (0.13)***		0.443 (0.18)**
Female (companion)	0.0107 (0.17)		0.0711 (0.21)
Female (interaction)	0.0665 (0.24)		-0.348 (0.28)
Recommend x liberal (respondent)	-0.162 (0.11)	-0.0140 (0.10)	-0.0374 (0.13)
Recommend x liberal (companion)	0.184 (0.13)	0.0858 (0.13)	-0.530 (0.16)***
Recommend x liberal (interaction)	0.0632 (0.15)	-0.111 (0.15)	-0.0525 (0.17)
Recommend x female (respondent)	0.0193(0.23)	-0.0383 (0.21)	-0.0145 (0.30)
Recommend x female (companion)	0.257 (0.26)	-0.0749 (0.25)	-0.0374 (0.34)
Recommend x female (interaction)	-0.0808 (0.36)	-0.238 (0.35)	-0.0557 (0.42)
(Std. Err. adjusted for 803 clusters in survey respondents)			
Number of obs = 9,636			
Log pseudolikelihood =-3237.3435		Pseudo R2 = 0.0826	
Wald chi2(36) = 288.20		Prob > chi2 = 0.0000	

*** 1% critical value
** 5% critical value
* 10% critical value

The *Table 5.1.4*: *The Results of the Marginal Effects* displays some marginal effects on beef and vegetarian choices in *Model (1)*. According to the *Table 5.1.4*, the recommendation's marginal effect of is 2.18% in the beef choice and 4.15% in the vegetarian choice. Thus, compared with non-recommendation, people are 2.18% more likely to choose beef products and are 4.15% more likely to select vegetarian products when recommended. The respondent's

political orientation in the vegetarian choice is 4.69%, and the explanation is that liberals have a 4.69% higher probability of choosing vegetarian protein than centrists. The respondent's political orientation has a negative effect on beef choice. Therefore, compared with centrists, liberals are 1.13% less likely to choose beef products.

The interaction term between recommendation and the respondent's political orientation is negative in beef and vegetarian choices. It means that liberals are 3.88% (1.04%) less likely to choose the beef (vegetarian) products when products are recommended than not recommended. The interaction term between recommendation, the respondent's, and dining companion's political orientations is positive in the beef choice and negative in the vegetarian choice. Thus, liberal people have a 3.10% higher probability of choosing the beef product when the recommendation is from a liberal than from a centrist. However, liberals will be 2.68% less likely to select the vegetarian product if it is recommended by a liberal than a centrist.

The respondent's gender in the beef choice is negative and positive in the vegetarian choice. It can be described as women are 10.5% less likely to choose the beef product but 7.08% more likely to choose the vegetarian product than men. Beef and vegetarian choices have negative interaction terms in the double difference and triple difference terms. Hence, when the beef (vegetarian) product is recommended, women are 0.44% (1.03%) less likely to choose it, compared with men. Also, if the vegetarian (beef) product is recommended by a female dining companion, women are 1.09% (2.22%) less likely to choose it, compared with men.

The marginal effects have some different significance levels and signs from the regression results in *Model (1)*. The coefficients and marginal effects are generated in different ways and have different meanings. For instance, the coefficient values show the relative probability of the base outcome (chicken choice). However, the marginal effects are calculated by the predicted probability that depends on the baseline probability (the denominator in the equation). Also, the marginal effects are the non-linearity functions of all estimated parameters and variables, but coefficients are not sometimes. Therefore, the significance levels and signs could be different in the coefficient values and marginal effects.

Table 5.1. 4: Marginal Effects of Model (1)[4]

	Beef	**Vegetarian**

[4] *** 1% critical value
** 5% critical value
* 10% critical value

$recommendation$	.0218 (0.020)	.0415 (0.029)
$Liberal_R$	-.0113 (0.012)	.0469 (0.022)*
$Liberal_S$	-.0143 (0.014)	-.0201 (0.021)
$Liberal_R * Liberal_S$	.00578 (0.016)	-.0222 (0.025)
$Female_R$	-.105 (0.020)***	.0708 (0.037)*
$Female_S$	.00190 (0.020)	-.0287 (0.031)
$Female_R * Female_S$	-.0174 (0.040)	-.0859 (0.060)
$Liberal_R * recommendation$	-.0388 (0.027)	-.0104 (0.028)
$Liberal_S * recommendation$	.0448 (0.031)	-.126 (0.039)***
$Liberal_R * liberal_S * recommendation$	.0310 (0.046)	-.0268 (0.041)
$Female_R * recommendation$	-.00444 (0.044)	-.0103 (0.054)
$Female_S * recommendation$	.0759 (0.055)	.188 (0.059)***
$Female_R * Female_S * recommendation$	-.0222 (0.087)	-.0109 (0.10)

The regression result of *Model (2)* is similar to the *Model (1).* The recommendation of chicken and the respondent's gender in the beef choice are still significant. However, in the vegetarian choice, the respondent's gender and political orientation are insignificant and different from the *Model (1)*. The *Model (2)* shows gender and political orientation don't impact people's vegetarian protein choices. The reason could be that gender and political orientation are able to affect the choice of food values (see *Appendix 5*).

The interaction term between the recommendation of vegetables with the companion's political orientation is significant which is the same as *Model (1)*, so people are willing to follow and order vegetarian proteins that are recommended by the conservative companion. The highlighted interaction terms are neither significant, so the recommendation from the companion who is from the same or different gender and political orientation group has the same influence on food choices.

The education level and its "prefer not to say" option are significant in the vegetarian and beef equations. These two variables are negative in the beef choice and positive in the vegetarian choice. Therefore, relative to chicken products, people with one level increase of education or those who don't want to show their education are more likely to choose vegetarian proteins and less likely to select beef products. In addition, the income level is not significant in vegetarian and beef choices, but its "prefer not to say option" is significant in the beef choice. It means that individuals who don't want to show their income level are more likely to choose beef products, rather than chicken.

The food neophobia scale is significant in the vegetarian equation with a negative

coefficient. This indicates that people with higher food neophobia are less likely to try vegetarian proteins relative to chicken. Some plant-based products or meat substitutes have low acceptance due to food neophobia (Hoek et al., 2011, p.670; Hartmann and Siegrist, 2017, p.22), so this result is not surprised. Animal welfare is significant at beef and vegetarian choices but has opposite coefficient signs. Compared with chicken, people who care about animal welfare prefer vegetarian products and unwilling to choose beef products. Hence, animal welfare is one of the motivations for shifting meat consumption to meat substitute consumption.

Food values have some effects on choices. Food safety and taste are significant in the beef choice. Compared with chicken, people who think safety or taste is one of the most important food values are more likely to select beef.

Table 5.1. 5: Model (2) Regression Results[5]

	Beef	***Chicken***	***Vegetarian***
Recommendation	-0.191 (0.17)	0.339 (0.14)**	0.155 (0.25)
Liberal (respondent)	0.00849 (0.073)		0.120 (0.10)
Liberal (companion)	-0.157 (0.096)		0.0379 (0.10)
Liberal (interaction)	0.0230 (0.10)		-0.0735 (0.12)
Female (respondent)	-0.425 (0.13)***		0.288 (0.18)
Female (companion)	0.00544 (0.17)		0.0502 (0.22)
Female (interaction)	-0.129 (0.24)		-0.355 (0.28)
Recommend x liberal (respondent)	-0.167 (0.11)	-0.00179 (0.10)	-0.0600 (0.13)
Recommend x liberal (companion)	0.210 (0.13)	0.0579 (0.13)	-0.508 (0.16)***
Recommend x liberal (interaction)	0.0511 (0.15)	-0.114 (0.15)	-0.0417 (0.18)
Recommend x female (respondent)	0.0738 (0.24)	-0.0512 (0.21)	-0.0118 (0.31)
Recommend x female (companion)	0.255 (0.27)	-0.0817 (0.25)	0.00930 (0.36)
Recommend x female (interaction)	-0.0373 (0.37)	-0.274 (0.35)	-0.0577 (0.44)
Education level	-0.0686 (0.038)*		0.111 (0.053)**
Education level$_{prefer\ not\ to\ say}$	-0.898 (0.41)**		1.649 (0.61)***
Income level	-0.0258 (0.030)		0.0443 (0.044)
Income level$_{prefer\ not\ to\ say}$	0.326 (0.19)*		0.231 (0.27)
Food neophobia scale	-0.00988 (0.053)		-0.316 (0.085)***
Animal welfare	-0.207 (0.054)***		0.319 (0.087)***

[5] *** 1% critical value
** 5% critical value
* 10% critical value

Food safety	0.430 (0.13)***		0.149 (0.18)
Nutrition	-0.0746 (0.13)		0.167 (0.19)
Taste	0.409 (0.12)***		-0.0230 (0.19)
(Std. Err. adjusted for 803 clusters in survey respondents)			
Number of obs = 9,636			
Log pseudolikelihood = -3144.0508		Pseudo R2 = 0.1090	
Wald chi2(54) = 410.23		Prob > chi2 = 0.0000	

The marginal effects of *Model (2)* have similar results as the *Model (1)* but have a smaller magnitude. The reason may be that, as more variables are added, the marginal effect of each variable becomes smaller.

The marginal effect of the education level is positive in the vegetarian choice and negative in the beef choice; thus, with one education level increase, people are 2.76% more likely to choose vegetarian products but 1.08% less likely to choose beef products. Animal welfare has different signs of beef and vegetarian choices. It indicates that people who have a higher-level concern of animal welfare are 7.89% more likely to select vegetarian products and 3.51% less likely to select beef products. Moreover, if one level higher of food neophobia, individuals have a 6.64% lower probability of consuming vegetarian proteins.

Table 5.1. 6: Marginal Effects of Model (2)[6]

	Beef	**Vegetarian**
$recommendation$	.0137 (0.015)	.0350 (0.027)
$Liberal_R$	-.00334 (0.0065)	.0249 (0.023)
$Liberal_S$	-.00999 (0.0081)	-.0225 (0.022)
$Liberal_R * Liberal_S$	.00359 (0.0084)	-.0198 (0.025)
$Female_R$	-.0484 (0.019)**	.0368 (0.037)
$Female_S$	.0000199 (0.011)	-.0320 (0.032)
$Female_R * Female_S$	-.0148 (0.022)	-.0893 (0.063)
$Liberal_R * recommendation$	-.0231 (0.018)	-.00850 (0.016)
$Liberal_S * recommendation$	.0255 (0.031)	-.123 (0.042)***
$Liberal_R * liberal_S * recommendation$	.0103 (0.022)	-.0161 (0.030)
$Female_R * recommendation$	.00474 (0.028)	-.00360 (0.034)
$Female_S *$	.0361 (0.032)	.223 (0.092)**

[6] *** 1% critical value
** 5% critical value
* 10% critical value

$recommendation$		
$Female_R * Female_S * recommendation$	-.0173 (0.057)	-.00351 (0.067)
Education level	-.0108 (0.0062)*	.0276 (0.013)**
Income level	.00266 (0.0032)	.0108 (0.011)
Food neophobia scale	-.000567 (0.0030)	-.0664 (0.026)***
Animal welfare	-.0351 (0.010)***	.0789 (0.023)***
Food safety	.0467 (0.024)**	.0351 (0.043)
Nutrition	-.00665 (0.012)	.0393 (0.044)
Taste	.0441 (0.022)**	-.00552 (0.045)

5.1.3 Model of Familiar and Unfamiliar Foods

Burgers and tacos are familiar foods, while donburi and palov are unfamiliar foods. The palov is omitted due to the collinearity, so palov is the base outcome. As *Table 5.1.7* shows, the recommendation of chicken and vegetarian products are significant, so people are more likely to choose vegetarian and chicken products when they are recommended.

The interaction between the recommendation with the burger is significant in the beef, chicken, and vegetarian choices. Beef burger has a positive coefficient, while the vegetarian burger has a negative coefficient. Compared with palov, people are more likely to choose the beef burger when recommended. Compared with palov, when recommending the vegetarian burger, people are less likely to accept it. The interaction between the recommendation with the taco is only significant at chicken choice. Coefficients are negative in interactions of chicken burger and taco. Thus, when familiar chicken products are recommended, people are less likely to select, compared with palov.

In unfamiliar foods, chicken choice has a significant interaction term of the donburi. This coefficient is still negative. Compared with palov, if the chicken donburi is recommended, people may not choose it. Therefore, the recommendation of familiar and unfamiliar chicken products has negative effects on the choice.

According to the pilot, around 75% of respondents are unfamiliar with the palov, and 72% are unfamiliar with donburi. Hence, palov is assumed to be the most unfamiliar product for people. People don't have information about the palov but had experiences with familiar products before. Therefore, compared with palov, they don't necessarily need the recommendation of familiar products. This is the reason for the negative signs of the interaction terms.

Table 5.1. 7: Model of Familiar and Unfamiliar Foods Regression Results

	Beef	Chicken	Vegetarian
Recommendation	-0.0536 (0.16)	0.681 (0.13)***	0.419 (0.23)*
Recommendation*burger	0.707 (0.19)***	-1.109 (0.30)***	-0.585 (0.27)**
Recommendation*taco	-0.128 (0.23)	-0.664 (0.17)***	0.349 (0.26)
Recommendation*donburi	-0.0820 (0.20)	-0.595 (0.19)***	-0.433 (0.28)
Recommendation*palov is omitted because of collinearity			
(Std. Err. adjusted for 803 clusters in survey respondents)			
Number of obs = 9,636			
Log pseudolikelihood = -3266.3747		Pseudo R2 = 0.0744	
Wald chi2(14) = 282.79		Prob > chi2 = 0.0000	

*** 1% critical value
** 5% critical value
* 10% critical value

5.2 Model of Side Dish Choice

As Chapter 4 shows, the side dish choice uses the binary logit model. This section will display the results of models without/with interaction terms.

5.2.1 Model without the Interaction with the Dining Companion

As *Table 5.2.1* displays, variables are significant with the positive coefficients, except for the income level. Thus, people are more likely to consume recommended healthy foods. Compared with men, women have a higher probability of selecting healthy foods. Also, well-educated or health-conscious individuals prefer healthy foods.

Table 5.2. 1: Regression Results of the Side Dish Choice Model without the Interaction with the Dining Companion

Variable	**Coefficient**
Recommended healthy side	0.207 (0.075)***
Health-conscious (respondent)	0.492 (0.056)***
Female (respondent)	0.185 (0.084)**
Education level	0.0681 (0.033)**
$\text{Education}_{\text{prefer not to sya}}$	0.347 (0.31)
Income level	-0.00118 (0.028)
$\text{Income}_{\text{prefer not to say}}$	-0.0389 (0.17)
(Std. Err. adjusted for 803 clusters in survey respondents)	
Number of obs = 3,212	
Log pseudolikelihood = -2150.7165	Pseudo R2 = 0.0325
Wald chi2(7) = 110.21	Prob > chi2 = 0.0000

*** 1% critical value
** 5% critical value
* 10% critical value

According to *Table 5.2.2*, people are 5.14% more likely to select healthy foods when they are recommended, compared with non-recommendation. Health-conscious people have a 12.2% higher probability of consuming healthy foods than nonhealthy people. Women are 4.62% more likely to choose healthy foods than men. Moreover, with one educational level higher, people are 1.69% more likely to select healthy foods.

Table 5.2. 2: Marginal Effects of the Side Dish Model without Interaction Terms

Variables	**Marginal Effects**
Recommended healthy side	.0514 (0.019)***
Health-conscious (respondent)	.122 (0.014)***
Female (respondent)	.0462 (0.021)**
Education level	.0169 (0.0081)**
Income level	-.000295 (0.0070)

5.2.2 Model with the Interaction with the Dining Companion

In this model, recommendation, the respondent's gender, education level, and health awareness are significant (the same results as the model without interaction terms).

This model's highlighted interaction terms are not significant, regardless of health awareness or gender. It indicates that the recommendation has the same impact on the choice of healthy food, regardless of the recommender has the same or different social identity from other people. This is the same conclusion as the model of the main dish choice. Therefore, the recommendation from the same or different social identities has the same effects on choices.

Table 5.2. 3: Regression Results of the Side Dish Choice Model with the Interaction with the Dining Companion

Variable	**Coefficient**	**Variable**	**Coefficient**
Recommended healthy side	0.284 (0.17)*		
Health-conscious (respondent)	0.507 (0.079)***	Female (respondent)	0.210 (0.12)*
Health-conscious (companion)	0.0151 (0.14)	Female (companion)	-0.218 (0.14)
Health-conscious (interaction)	0.0118 (0.13)	Female (interaction)	0.166 (0.20)
Recommend x health-conscious (respondent)	-0.109 (0.13)	Recommend x female (respondent)	-0.113 (0.20)
Recommend x health-conscious	0.0916 (0.21)	Recommend x female (companion)	-0.0618 (0.24)

(companion)			
Recommend x health-conscious (interaction)	0.138 (0.20)	Recommend x female (interaction)	-0.232 (0.32)
Income level	-0.000682 (0.028)	Education level	0.0674 (0.033)**
$\text{Income}_{\text{prefer not to say}}$	-0.0279 (0.17)	$\text{Education}_{\text{prefer not to sya}}$	0.339 (0.31)
(Std. Err. adjusted for 803 clusters in survey respondents)			
Number of obs = 3,212			
Log pseudolikelihood = -2145.4641		Pseudo R2 = 0.0349	
Wald chi2(17) = 121.53		Prob > chi2 = 0.0000	

*** 1% critical value
** 5% critical value
* 10% critical value

The marginal effects of the model with the interaction terms are similar to the model without the interaction terms. As *Table 5.2.4* shows, the marginal effect of the interaction between the recommendation, respondent's, and dining companion's gender is -0.0573. Therefore, when healthy food is recommended by a female dining companion, women are 5.73% less likely to choose it than men. The interaction term between the recommendation, respondent's, and dining companion's health-consciousness has a positive marginal effect. It shows that, if a health-conscious dining companion recommends healthy food, health-conscious people are 3.21% more likely to choose it than people without health-consciousness.

Table 5.2. 4: Marginal Effects of the Side Dish Choice Model with the Interaction Terms

Variables	**Marginal Effects**	**Variables**	**Marginal Effects**
Recommended healthy side	.0502 (0.019)***		
Health-conscious (respondent)	.122 (0.014)***	Female (respondent)	.0492 (0.021)**
Health-conscious (companion)	.0232 (0.020)	Female (companion)	-.0836 (0.044)*
Health-conscious (interaction)	.00628 (0.042)	Female (interaction)	.0197 (0.038)
Recommend x health-conscious (respondent)	-.105 (0.032)***	Recommend x female (respondent)	-.510 (0.035)***
Recommend x health-conscious (companion)	.0455 (0.039)	Recommend x female (companion)	-.0132 (0.042)
Recommend x health-conscious (interaction)	.0321 (0.049)	Recommend x female (interaction)	-.0573 (0.080)
Income level	-.000170 (0.0071)	Education level	.0167 (0.0081)**

Chapter 6—Discussion

This thesis investigates the effects of different social identities on food choices. The hypotheses I test relative the effect of gender, political orientation, health awareness, and food recommendation on food choices. Also, the hypotheses include the effect of the recommendation from the companion who has the same social identities on others' food decisions.

The results show that most hypotheses cannot be rejected, such as the impacts of gender, political orientation, and health consciousness on food choice. The food recommendation influences food choices, but the recommender's political orientation have little impact. This chapter discusses the results and compares them with previous research. Discussions include social identities, social interactions, and other characteristics.

6.1 Social Identities

Gender impacts food choices. Results show that men prefer beef products, but women are more likely to choose vegetarian proteins. This finding is consistent with previous research showing that men eat meat more often, while women consume vegetables more frequently (Prättälä et al., 2007, p.522; Graca, Calheiros, and Oliveira, 2015, p.114; Cavazza, Guidetti, and Butera, 2017, p.97).

This difference could be caused by ideology and food interests. Meat is a prototypical food for men. For example, different from women, men have a significantly higher attitudinal support for statements of "pro-red meat" items, including the bodily and hedonic pleasure from meat consumption and degree of bloodiness in meat (Kubberød et al., 2002, p.293). However, women have an evident decreased mean hedonic rating of the red meat varieties (Kubberød et al., 2002, p.292). Typically, women are not comfortable with the sensation of blood from meat consumption, so they have lower interest in increasing beef consumption and hope to decrease eating processed meat (Kubberød et al., 2002, p.293; Hayley et al., 2015, p.103). Hence, women may prefer some easily digested foods than "heavy" red meat.

In the side dish choice model, results show women are more likely to eat healthy foods

than men. The reason could be that women care more about healthy diets and are more likely to classify foods by the nutrient contents than men (Prättälä et al., 2007, p.520).

Political orientation partially determines the acceptance of vegetarian proteins. Results show that liberals are more likely to select vegetarian proteins; in other words, conservatives are less willing to accept vegetarian proteins. This result is consistent with the finding from Wilks et al. (2019) that conservatives have negative attitudes to cultured meat (p.138).

Liberals and conservatives have different characteristics that lead to different food choices. For example, openness is one of the liberals' characteristics, so liberals are more open to accept novel foods than conservatives. Also, liberals care more about the environment. Meat productions cause environmental issues (Graca et al., 2019, p.19; Hoek et al., 2004, p.265; Hartmann and Siegrist, 2017, p.11; Apostolidis and McLeay, 2016, p.75; Machovina, Feeley, and Ripple, 2015, p.420), so liberals are more likely to reduce meat consumption and shift to vegetarian proteins. On the other hand, conservatives care about traditional values and are sensitive to novel products, so the conservative group has stronger preferences for meat (Kumpulainen et al., 2018, p.180; Dhont and Hodson, 2014, p.12).

Results find that people who have health-consciousness are more likely to select healthy foods. The reason could be that the personal goals of a healthy lifestyle influence self-regulation and motivate health-promoting behaviors (Bitter and Kulesz, 2015, p.340). In other words, health-conscious people are inspired to keep or improve their state of well-being by healthy behaviors, like eating healthy foods (Barauskaite et al., 2018, p.60).

6.2 Social Interactions

The recommendation has positive effects on food choices. Once the food is recommended, people are more likely to choose it. Social interaction is the motivation for people to follow the recommendation, but another reason could be that recommendation is a signal of quality. Regarding social interaction, people want to leave a certain impression and conform to social norms by changing their food intake the same as someone else eating (Bitter and Kulesz, 2015, p.337). Hence, social pressures make the population to eat or avoid certain foods (Pollard, Kirk, and Cade, 2002, p.378). For example, people will eat high amounts of vegetables if they are under the social influence of eating vegetables (Pollard, Kirk, and Cade, 2002, p.378).

One of the situations that recommendation works as the quality signal is the imperfect

information of the product. For instance, when consumers search for novel products' information, they often look for advice and others' recommendations (Alemu et al., 2017, p.46). However, consumers' choice to follow recommendations may depend on the premise that the recommendation comes from reliable sources. According to Alemu et al. (2017), consumers strongly prefer recommendations from officials, the media, and from peers, and this implies that individuals lower their uncertainty of a novel product without previous taste experience by seeking others' endorsements of the product (p.54). Therefore, social interaction, such as one-way or two-way interactions, helps consumers to distinguish the sources. One-way social interaction could be *Food Guide* from the government website or article from official media, and two-way social interaction includes communication between friends and family, or meeting with "in-group" members. Hence, recommendations from the social interaction and as a signal of quality are correlated. Research results are hard to distinguish the reason why respondents follow recommendations. Individuals are more likely to choose recommended products. However, this hypothesis doesn't specify whether the dining companion is from the same group or not, and another hypothesis that includes the dining companion's social identity is not accepted.

When the recommender is from the conservative group, respondents are more likely to follow the recommendation to eat vegetarian products. In the stereotype and previous research, conservatives prefer meat products than vegetables (Dhont and Hodson, 2014, p.12; Hodson and Earle, 2018, p.76; Pfeiler and Egloff, 2018, p.247). Thus, this is an interesting finding.

Results show that if the recommender is defined as from the same or opposite social identities as others, the recommendation may have the same effects on food choices. For instance, when a health-conscious person wants to select foods, the recommendation from a health-conscious or unhealth-conscious companion has the same impact on his/her decision.

However, this finding is contrary to previous research, because previous research shows recommendations from the same social identities have powerful impacts (Higgs, 2015, p.39; Higgs and Thomas, 2016, p.2). For instance, according to Higgs (2015), individuals from the same social identities are "in-group" and want to follow others' norms; otherwise, they will be "out-group" and disliked (p.41). Following the recommended food choice from in-group members is the correct behavior. Also, without social participation and social supports, it's hard to change diet and incorporate dietary recommendations (Pollard, Kirk, and Cade, 2002, p.379). In-group members have shared identities and provide supports to each other, and social

participation includes following the recommended choice. The sample size of the survey is 803, which may not be enough to prove this hypothesis (*See Appendix 7: Confidence Interval Check*). Therefore, one of the reasons for this contradiction could be statistical power.

6.3 Other Characteristics

Results reveal that educated people are more likely to choose vegetarian proteins and healthy foods. This is consistent with previous research which has found that people in a high socio-economic position are more likely to follow healthier food habits and select "modern", high-status foods, but people in a lower position may choose more traditional, lower-status foods (Barauskaite et al., 2018, p.61; Lallukka et al., 2006, p.701). Education is one of the primary indicators of socio-economic status and is linked to healthy diets (Groth, Fagt, and Brøndsted, 2001, p.960).

Education displays an individual's knowledge and attitudes that can assist in following recommended healthy food habits (Lallukka et al., 2006, p.702; Groth, Fagt, and Brøndsted, 2001, p.960). For instance, highly educated people have the most similar dietary habits to the guidelines (Groth, Fagt, and Brøndsted, 2001, p.961). Also, according to Lallukka et al. (2006), education is correlated with vegetable consumption (p.708).

Animal welfare is a significant variable in the beef and vegetarian choices. People who are concerned about animal welfare consume fewer meat products and more vegetarian proteins. The meat substitute diet is determined by either ethical or moral reasons, and meat avoidance is linked to a moral dimension (Kumpulainen et al., 2018, p.179).

New food technology's success is decided by consumer acceptance (Wilks et al., 2019, p.137). Results indicate that food neophobia lowers the acceptance of vegetarian protein products, such as plant-based products, that is consistent with findings from Apostolidis and Mcleay (2016) and Hoek et al. (2011). The unfamiliarity of the plant-based products is the key barrier to meat substitute consumption for non-users or light-users (Hoek et al., 2011, p.670). Thus, consumers need to be repeatedly exposed to plant-based products to reduce food neophobia (Pollard, Kirk, and Cade, 2002, p.377).

Food values, such as safety and taste, have impacts on meat consumption. Consumers who think safety or taste is the most important food value are more likely to choose beef products. However, this finding is the opposite of Verbeke and Viaene (2009) views. They

thought the decreased beef and pork consumption seemed to be correlated with consumers' increased concerns about food safety (p.149). This result could be linked with food neophobia. Compared with plant-based products, consumers may have more trust in traditional meat products.

Meat products are generally found to be tastier, while taste is a barrier to plant-based products. Individuals consume fewer meat substitutes when having a more positive sensory perception of meat (Hoek et al., 2011, p.670; Reipurth et al., 2019, p.291). The taste of meat substitutes cannot meet consumers' satisfaction with meat, and meat substitutes cannot reflect the unique taste and texture properties of meat on the current market (Hoek et al., 2011, p.670).

Chapter 7—Limitations and Future Research

One big limitation is the hypothetical nature of the survey. Respondents are told to imagine they are dining with a companion. Descriptions of the companion cannot convey the same information to everyone. Therefore, they could ignore or don't care about the companion's characteristics and directly choose the food they are used to choosing. In addition, hypothetical settings of the survey may cause hypothetical bias because individuals can make a different choice in hypothetical scenarios and in real life. In the survey, respondents don't have direct incentives to reveal their true preferences because they don't have to pay the money for the food they choose and may not believe that their choice will change the decision based on the research results (Fifer, Rose, and Greaves, 2014, p.165). Future research can use real scenes that make the survey take place in the restaurant, and it will help respondents immerse themselves in the dining scenarios and get more accurate feedback.

The survey design uses a "forced-choice" design without an "opt-out" option. Respondents have to choose one food product between main (side) dish choices, and they are more likely to choose these products than the design with an "opt-out" option. However, this forced choice will make respondents have to choose one though they may be uncertain of their utility of choosing one product (Dhar and Simonson, 2003, p.157). According to Dhar and Simonson (2003), forced-choice procedures may lead to incorrect conclusions due to the biased or incomplete findings (p.156). Therefore, future research can add the no-choice option to the design to compare the differences in results.

This research ignores the ordering effect. In the choice experiment, the order of restaurants is random, but the order of appearance of familiar and unfamiliar foods may change respondents' choices. Future research can investigate the ordering effects of food choice.

In future research, the choice of meat or vegetarian product can be added to the independent variables, so that the model can check whether the previous meat/vegetarian choice would affect the individual's choice of healthy foods. For example, $U_{healthy\ side\ dish} = \beta_0 + \beta_1 *$

$meat\ choice\ of\ main\ dish + \beta_2 * vegetarian\ choice\ of\ main\ dish + \beta_3 * recommendation + \cdots$

This thesis uses the multinomial logit model and binary logit model. Future research can use diverse models to explore the results from different perspectives. For example, using the random parameter logit (RPL) model to explore individual respondents' preference heterogeneity, or using the latent class model (LCM) to find consumer segments' preference heterogeneity (Alemu et al., 2017, p.49).

Chapter 8—Conclusion

In conclusion, food choice is a complicated process, and this thesis explores factors that determine food choice, such as social identities, social interactions, and food values. This thesis did an online survey across Canadians. This survey uses the discrete choice experiment that respondents need to make food choice when they are told to imagine they are dining in different scenarios. Respondents face four scenarios, including dining with a companion and dining alone, and need to choose a main dish and a side dish in each scenario. Main dish choices include beef, chicken, and vegetarian, and side dish choices include healthy (salad) and unhealthy (fries, onion ring, chips, or tempura) sides. The multinomial logit model is used in the main dish choice, and the main dish choice model finds that factors influence individuals' choices of vegetarian and meat products. The side dish choice model uses the binary logit model and analyzes that factors change healthy food choice.

Research results show people have consistent eating behaviors with their identities. Women are more likely to follow their identity to choose vegetarian proteins when men choose meat products. And women pay more attention to health and are more likely to choose healthy foods than men. Liberals are more open than conservatives, and this characteristic makes them have a relatively high acceptance of vegetarian proteins. Health-conscious people who want to conform to their eating behaviors with their lifestyle prefer healthy foods than unhealthy foods.

Other characteristics, such as education, food neophobia, concerns about animal welfare, and food values, also have effects on food decisions. Through their knowledge, highly educated people want to select healthy foods. Some people's moral concerns about animal welfare shift their choices from meat products to vegetarian proteins. However, consumers' acceptance of vegetarian proteins is reduced by food neophobia. Food values influence consumer choices of meat products. The unique taste of meat attracts consumers who think the taste is the most important food value, and consumers who care about food safety are also more likely to select meat products.

Food recommendations from social interactions play a role in food selections. Individuals

are more likely to choose the recommended food. However, if the recommender is described as being from the same social identity group as other people, his or her recommendation will not have a stronger effect.

Overall, these findings may help policymakers to promote healthy diets to the public. For example, official food guides provide professional and latest healthy food recommendations that have positive effects on healthy food choice. Therefore, if the government strengthens the publicity and lets more people know food guides, people will be more likely to adopt these healthy foods.

Food industrial stakeholders or producers can use the research findings to find their target markets and increase their market shares. For example, compared with conservatives, liberals are more open to select vegetarian proteins. Thus, producers of plant-based products can try to sell in larger quantities to areas where have more liberals, such as Ontario, than areas where have more conservatives, such as Western Canada. In addition, food neophobia lowers the likelihood of choosing vegetarian proteins. If producers want to increase their market shares, they need to make consumers become familiar with the plant-based products and increase their acceptance. Producers would provide more information about their products and let consumers know product ingredients are from their familiar vegetables. As more information is given, consumers could decrease their food neophobia.

This thesis found that social identities, such as health-consciousness, play roles in food choice. Consumers can also utilize this finding to adjust their lifestyle. For instance, when consumers develop some ideas about health-consciousness, they have a higher probability of choosing healthy foods due to the increased health-consciousness. Hence, In the long term, consumers will have a healthy eating habit and lifestyle.

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APPENDICES

APPENDIX A: Menus of Restaurants

The menus are as follows [order of items should be randomized]:

Burger restaurant

Lunch menu

Beef burger $10
All-beef patty, lettuce, tomato, onions and pickles.

Chicken burger $10
Chicken breast, lettuce, and tomato.

Vegetarian burger $[8-12]
House made vegetable patty, lettuce, tomato, onions and pickles.

All orders come with a side of fries or a tossed salad.

Food is made to order and substitutions can be made.

Taco restaurant

Lunch menu

Beef taco $10
Ground beef, lettuce, tomato, onions and red peppers.

Chicken taco $10
Shredded chicken, lettuce, tomato, onions and red peppers.

Bean and avocado taco $[8-12]
Refried or black beans, avocado, lettuce, tomato, onions and red peppers.

All orders come with a side of tortilla chips or a Mexican chopped salad (lettuce, red pepper, onion, zucchini, tomatoes, corn, and cilantro).

Food is made to order and substitutions can be made.

Donburi restaurant

Donburis are

Lunch menu

Gyu donburi $10
Beef and onions in a sweet sauce, served over rice.

Chicken karage donburi $10
Soy marinated chicken, served over rice with Japanese pickles.

Tofu donburi $[8-12]
Panko breaded fried tofu, shiitake mushrooms, and asparagus, served over rice.

Donburis are a Japanese rice bowl dish. The ingredients in the dish are simmered together and served over rice.

All orders come with a side of yam tempura or a salad (spring mix vegetables, cucumber slices, and tomatoes with soft white dressing).

Food is made to order and substitutions can be made.

Palov restaurant

Lunch menu

Beef palov $10
Ground beef, carrots, raisins, onions, and served with rice.

Chicken palov $10
Ground chicken, carrots, onions, berries, and served with rice.

Vegetarian palov $[8-12]
Ground beyond meat, beans, carrots, onions, apples, and served with rice.

Palov are a rice dish common in Uzbekistan. All ingredients are cooked together with a blend of spices.

All orders come with a side of onion rings or an Uzbek salad (onions, tomatoes, cilantro, and pomegranate seeds).

Food is made to order and substitutions can be made.

APPENDIX B: Choice descriptions of Scenarios

Scenario 1. You are eating at a [burger/taco/donburi/palov] restaurant with your friend [NAME]. [NAME] has been travelling for the past month and has brought you some souvenirs. [He/she] shares some funny stories from [his/her] travels. [[He/she] visited many attractions on foot, which felt as exhausting as the hour [he/she] usually spends in the gym every day.] [NAME] also recommended a book that [he/she] read during the vacation [that seemed to have a conservative/liberal viewpoint and said [he/she] attended some political rallies] *[Delete red parenthetical for no political affiliation]*. Then you both take a look at the menu.

After you talk with [NAME] for a few minutes, the waiter comes to take your orders. [NAME] orders the [chicken/beef/vegetarian option] and [healthy/unhealthy option] and recommends that you try them yourself. What do you order?

Select the [burger/taco/donburi/palov] you would order:
- ☐ [Beef]
- ☐ [Chicken]
- ☐ [Vegetarian]

Select the side you would order:
- ☐ [Healthy]
- ☐ [Unhealthy]

Scenario 2. Your friend, [NAME], and you are dining together at a [burger/taco/donburi/palov] restaurant. You ask what [he/she] has been up to lately. [He/she] brings you up to date on a few things that have been happening in [his/her] life and says that [he/she] has just started volunteering for [a community group/the liberal party/the conservative party]. [[NAME] also mentions that [he/she] has started working out at a new gym that recently opened in town.] Then you both take a look at the menu.

[INSERT MENU]

After catching up with [NAME] for a few moments, the waiter comes to take your orders. [NAME] orders the [chicken/beef/vegetarian option] and [healthy/unhealthy option] recommends that you try them yourself. What do you order?

Select the [burger/taco/donburi/palov] you would order:
- ☐ [Beef]
- ☐ [Chicken]
- ☐ [Vegetarian]

Select the side you would order:
- ☐ [Healthy]
- ☐ [Unhealthy]

Scenario 3. You are having lunch with your friend [NAME] at a [burger/taco/donburi/palov] restaurant. [NAME] shows up a bit late and apologizes [saying that [his/her] cross-fit class ran late]. You hear the next table talking about politics, and you ask your friend whether [he/she] is interested in politics. [NAME] replies that [he/she] reads a lot about politics and [actively supports left-wing/conservative issues] *[Delete red parenthetical for no political affiliation]*. Then you both take a look at the menu.

[INSERT MENU]

After chatting for a few moments, the waiter comes to take your orders. [NAME] orders the [chicken/beef/vegetarian option] and [healthy/unhealthy option] recommends that you try them yourself. What do you order?

Select the [burger/taco/donburi/palov] you would order:
- ☐ [Beef]
- ☐ [Chicken]
- ☐ [Vegetarian]

Select the side you would order:
- ☐ [Healthy]
- ☐ [Unhealthy]

Scenario 4. You are having a meal with your friend [NAME] at a [burger/taco/donburi/palov] restaurant. You've been friends with [NAME] for some time [and know that [he/she] is generally quite liberal/conservative] *[Delete red parenthetical for no political affiliation]* [and is very concerned about [his/her] health]. You ask [NAME] what is new in [his/her] life, and [he/she] brings you up-to-date on what [he/she] has been doing. Then you both take a look at the menu.

[INSERT MENU]

You chat for a few minutes and the waiter comes to take your orders. [NAME] orders the [chicken/beef/vegetarian option] and [healthy/unhealthy option] recommends that you try them yourself. What do you order?

Select the [burger/taco/donburi/palov] you would order:
- ☐ [Beef]
- ☐ [Chicken]
- ☐ [Vegetarian]

Select the side you would order:
- ☐ [Healthy]
- ☐ [Unhealthy]

Scenario 5 (Dining alone). You are dining by yourself in a [burger/taco/donburi/palov] restaurant with the following menu.

[INSERT MENU]

What do you order?

Select the [burger/taco/donburi/palov] you would order:

- ☐ [Beef]
- ☐ [Chicken]
- ☐ [Vegetarian]

Select the side you would order:

- ☐ [Healthy]
- ☐ [Unhealthy]

APPENDIX C: Non-choice Experiments

B1:

How much do you agree or disagree with the following statements (1 is strongly disagree, 5 is strongly agree):

	1	2	3	4	5
I pay attention to politics					
A traditional family unit with a father and mother is the ideal environment for a child[7]					
Religion has a positive effect on society					
Social values are changing too quickly					
I have great respect for law enforcement					
The size of government ought to be kept as small as possible					
Large corporations do more harm than good					
Government ought to increase funding for social programs					
It is important for government to reduce the national debt					

B2:

What best describes your political orientation:

1	Very conservative
2	Conservative
3	Centrist
4	Liberal
5	Very liberal

C1:

How much do you agree or disagree with the following statements (1 is strongly disagree, 5 is strongly agree):

	1	2	3	4	5
I eat a healthy diet					
I eat enough vegetables and fruits					
I eat enough whole grain foods					
I eat a lot of processed foods					
I consume a lot of sugar					
I drink a lot of soft drinks					

D1:

How frequently do you consume meat[8]?

- 3 times a day or more
- 1 to 2 times per day
- At least once a week, but less than once a day
- At least once a month, but less than once a week

[7] 8 questions are cited from: Everett, J. A. C. (2013). The 12 Item Social and Economic Conservatism Scale (SECS). *PLoS ONE*, *8*(12). doi: 10.1371/journal.pone.0082131

[8] Cited from Dr. Peter

- Less than once a month
- Never

D2:
How frequently do you consume meat substitutes such as tofu, beyond meat, or plant-based ground meat?
- 3 times a day or more
- 1 to 2 times per day
- At least once a week, but less than once a day
- At least once a month, but less than once a week
- Less than once a month
- Never

E1:
How much do you agree or disagree with the following statements (1 is strongly disagree, 5 is strongly agree)[9]:

	1	2	3	4	5
I am constantly sampling new and different foods					
There are too many new foods available nowadays					
If food looks weird to me, I will not try it					
I prefer familiar and safe foods					
I do not trust novel foods					

E2:
How much do you agree or disagree with the following statements (1 is strongly disagree, 5 is strongly agree)[10]:

	1	2	3	4	5
Animals should be granted the same rights as humans					
Animal testing cannot be justified and should be stopped					
It is morally wrong to eat meat					
It is wrong to wear leather or animal fur					
I am very concerned about pain and suffering in animals					

E3:
Please choose and rank 5 food values that you think are the most important:
Food values and descriptions[11]:

Value	**Descriptions**
Naturalness	The extent to which food is produced without modern technologies
Taste	The taste of the food
Price	The price of the food
Safety	Eating the food will not cause illness

[9] Cited from Dr. Peter and Backstrom, Pirttila-Backman and Tuorila, 2004, p.78
[10] Cited from Dr. Peter
[11] Cited from Lusk and Briggeman, 2009, p.187

Convenience	The ease with which food is cooked and/or consumed
Nutrition	The amount and type of fat, protein, vitamins, etc
Tradition	Whether the food is produced and consumed in a traditional manner
Origin	Where the food was grown and processed
Fairness	The extent to which all parties involved in the production of food equally benefit
Appearance	The look of the food
Environmental impact	The effect of food production on the environment
Animal welfare	The well-being of farm animals

Demographic characteristics

F1:

What is your gender?

- Female
- Male
- Other
- Prefer not to say

F2:

What is your age?

- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- Over 65
- Prefer not to say

F3:

In which province or territory do you reside?

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador
- Northwest Territories
- Nova Scotia
- Nunavut
- Prince Edward Island
- Ontario
- Quebec
- Saskatchewan
- Yukon
- Prefer not to say

F4:
Do you live in an urban or rural area?
- Urban
- Rural
- Prefer not to say

F5:
Including yourself, how many people live in your household?
- Number:__
- Prefer not to say

F6:
How many children (under 18 years of age) live in your household?
- None
- One
- Two
- Three
- Four
- More than four
- Prefer not to say

F7:
What is the highest level of education that you have completed?
- Elementary or junior high school
- Some high school
- Completed high school
- Some post-secondary (i.e. college or university)
- Completed college or technical institute
- Completed Bachelor's degree
- Completed Master's degree
- Completed PhD degree
- Prefer not to say

F8:
Please indicate your approximate yearly household income before tax[12]:
- Less than $25,000
- $25,000-$34,999
- $35,000-49,999
- $50,000-$74,999
- $75,000-$99,999
- $100,000-$149,999
- More than $150,000
- Prefer not to say

[12] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1110000801

APPENDIX D: The Calculation of the Marginal Effects

Appendix D.1 Multinomial Logit Model Examples

Examples are based on the Model (1).

Appendix D.1.1 Effect of a single variable

When a variable's value changes from 0 to 1, this change will affect food choice.
For example, the effect of the recommendation of the vegetarian product is:

$$effect\ of\ rec_{veg} = pr\left(y = veggie\ choice \middle| rec_{veg} = 1\right) - pr\left(y = veggie\ choice \middle| rec_{veg} = 0\right)$$

when $rec_{veg} = 1, rec_{chicken}\ ,\ rec_{beef} = 0$:

$$\begin{aligned} U_{veggie1} = {} & \beta_{11} * mean\ veggie\ price + \beta_{12} + \beta_{13} * mean\ Liberal_{R_k} + \beta_{14} * mean\ Liberal_{S_k} \\ & + \beta_{15} * mean\ Liberal_{R_k} + \beta_{16} * mean\ Liberal_{S_k} + \beta_{17} * mean\ Liberal_{R_k} \\ & * mean\ Liberal_{S_k} + \beta_{18} * mean\ Liberal_{R_k} * mean\ Liberal_{S_k} + \beta_{19} \\ & * mean\ Female_{R_k} + \beta_{20} * mean\ Female_{S_k} + \beta_{21} * mean\ Female_{R_k} + \beta_{22} \\ & * mean\ Female_{S_k} + \beta_{23} * mean\ Female_{R_k} * mean\ Female_{S_k} + \beta_{24} \\ & * mean\ Female_{R_k} * mean\ Female_{S_k} \end{aligned}$$

$$\begin{aligned} U_{beef_1} = {} & \beta_{26} * mean\ Liberal_{R_k} + \beta_{27} * mean\ Liberal_{S_k} + \beta_{30} * mean\ Liberal_{R_k} \\ & * mean\ Liberal_{S_k} + \beta_{32} * mean\ Female_{R_k} + \beta_{33} * mean\ Female_{S_k} + \beta_{36} \\ & * mean\ Female_{R_k} * mean\ Female_{S_k} \end{aligned}$$

$$\begin{aligned} U_{chicken_1} = {} & \beta_{39} * mean\ Liberal_{R_k} + \beta_{40} * mean\ Liberal_{S_k} + \beta_{43} * mean\ Liberal_{R_k} \\ & * mean\ Liberal_{S_k} + \beta_{45} * mean\ Female_{R_k} + \beta_{46} * mean\ Female_{S_k} + \beta_{49} \\ & * mean\ Female_{R_k} * mean\ Female_{S_k} \end{aligned}$$

$$pr\left(y = veggie\ choice \middle| rec_{veg} = 1\right) = pr\left(\frac{\exp\left(U_{veggie1}\right)}{\exp\left(U_{beef1}\right) + \exp\left(U_{chicken1}\right) + \exp\left(U_{veggie1}\right)}\right)$$

when $rec = 0, rec_{chicken}\ ,\ rec_{beef} = 0$:

$$\begin{aligned} U_{veggie2} = {} & \beta_{11} * mean\ veggie\ price + \beta_{13} * mean\ Liberal_{R_k} + \beta_{14} * mean\ Liberal_{S_k} + \beta_{17} \\ & * mean\ Liberal_{R_k} * mean\ Liberal_{S_k} + \beta_{19} * mean\ Female_{R_k} + \beta_{20} \\ & * mean\ Female_{S_k} + \beta_{23} * mean\ Female_{R_k} * mean\ Female_{S_k} \end{aligned}$$

$$pr\left(y = veggie\ choice \middle| rec_{veg} = 0\right) = pr\left(\frac{\exp\left(U_{veggie2}\right)}{\exp\left(U_{beef1}\right) + \exp\left(U_{chicken1}\right) + \exp\left(U_{veggie2}\right)}\right)$$

Therefore, the effect of the recommendation of the vegetarian product is:

$$
\begin{aligned}
&effect\ of\ rec_{veg} \\
&\quad = pr\big(y = veggie\ choice \big| rec_{veg} = 1\big) - pr\big(y = veggie\ choice \big| rec_{veg} = 0\big) \\
&\quad = pr\left(\frac{\exp\big(U_{veggie1}\big)}{\exp\big(U_{beef1}\big) + \exp\big(U_{chicken1}\big) + \exp\big(U_{veggie1}\big)}\right) \\
&\quad - pr\left(\frac{\exp\big(U_{veggie2}\big)}{\exp\big(U_{beef1}\big) + \exp\big(U_{chicken1}\big) + \exp\big(U_{veggie2}\big)}\right)
\end{aligned}
$$

Appendix D.1.2 Effect of the Interaction with Two Terms (Double Difference)

When two variables interact, food choice is influenced by the variables' value change. The effect of the interaction terms uses the method of *double difference* and the *triple difference*. For example, the effect of the interaction term of recommendation of the vegetarian product with the respondent's political orientation is:

$$
\begin{aligned}
&pr\left(y = veggie\ choice \middle| rec_{veg} * Liberal_{R_{veg}}\right) \\
&\quad = pr\,\langle\Big[\Big(y = veggie\ choice \Big| rec_{veg} = 1, Liberal_{R_{veg}} = 1\Big) \\
&\quad - \Big(y = veggie\ choice \Big| rec_{veg} = 1, Liberal_{R_{veg}} = 0\Big)\Big] \\
&\quad - \Big[\Big(y = veggie\ choice \Big| rec_{veg} = 0, Liberal_{R_{veg}} = 1\Big) \\
&\quad - \Big(y = veggie\ choice \Big| rec_{veg} = 0, Liberal_{R_{veg}} = 0\Big)\Big]\rangle \\
&= pr\,\langle\Big(y = veggie\ choice \Big| rec_{veg} = 1, Liberal_{R_{veg}} = 1\Big) \\
&\quad - \Big(y = veggie\ choice \Big| rec_{veg} = 1, Liberal_{R_{veg}} = 0\Big) \\
&\quad - \Big(y = veggie\ choice \Big| rec_{veg} = 0, Liberal_{R_{veg}} = 1\Big) \\
&\quad + \Big(y = veggie\ choice \Big| rec_{veg} = 0, Liberal_{R_{veg}} = 0\Big)\rangle
\end{aligned}
$$

When $rec_{veg} = 1, Liberal_{R_{veg}} = 1, rec_{chicken}, rec_{beef} = 0$, and $Liberal_{R_{beef}}, Liberal_{R_{chicken}} = 0$:

$$
\begin{aligned}
U_{veggie3} &= \beta_{11} * mean\ veggie\ price + \beta_{12} + \beta_{13} + \beta_{14} * mean\ Liberal_{S_k} + \beta_{15} + \beta_{16} \\
&\quad * mean\ Liberal_{S_k} + \beta_{17} * mean\ Liberal_{S_k} + \beta_{18} * mean\ Liberal_{S_k} + \beta_{19} \\
&\quad * mean\ Female_{R_k} + \beta_{20} * mean\ Female_{S_k} + \beta_{21} * mean\ Female_{R_k} + \beta_{22} \\
&\quad * mean\ Female_{S_k} + \beta_{23} * mean\ Female_{R_k} * mean\ Female_{S_k} + \beta_{24} \\
&\quad * mean\ Female_{R_k} * mean\ Female_{S_k} \\
U_{beef3} &= \beta_{27} * mean\ Liberal_{S_k} + \beta_{32} * mean\ Female_{R_k} + \beta_{33} * mean\ Female_{S_k} + \beta_{36} \\
&\quad * mean\ Female_{R_k} * mean\ Female_{S_k} \\
U_{chicken3} &= \beta_{40} * mean\ Liberal_{S_k} + \beta_{45} * mean\ Female_{R_k} + \beta_{46} * mean\ Female_{S_k} + \beta_{49} \\
&\quad * mean\ Female_{R_k} * mean\ Female_{S_k}
\end{aligned}
$$

$$
\Big(y = veggie\ choice \Big| rec_{veg} = 1, Liberal_{R_{veg}} = 1\Big) = \frac{\exp\big(U_{veggie3}\big)}{\exp\big(U_{beef3}\big) + \exp\big(U_{chicken3}\big) + \exp\big(U_{veggie3}\big)}
$$

When $rec_{veg} = 1, Liberal_{R_{veg}} = 0, rec_{chicken}, rec_{beef} = 0$, and $Liberal_{R_{beef}}, Liberal_{R_{chicken}} = 0$:

$$U_{veggie4} = \beta_{11} * mean\ veggie\ price + \beta_{12} + \beta_{14} * mean\ Liberal_{S_k} + \beta_{16} * mean\ Liberal_{S_k} + \beta_{19} * mean\ Female_{R_k} + \beta_{20} * mean\ Female_{S_k} + \beta_{21} * mean\ Female_{R_k} + \beta_{22} * mean\ Female_{S_k} + \beta_{23} * mean\ Female_{R_k} * mean\ Female_{S_k} + \beta_{24} * mean\ Female_{R_k} * mean\ Female_{S_k}$$

$$\left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 0\right) = \frac{\exp(U_{veggie4})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie4})}$$

When $rec_{veg} = 0, Liberal_{R_{veg}} = 1, rec_{chicken}, rec_{beef} = 0$, and $Liberal_{R_{beef}}, Liberal_{R_{chicken}} = 0$:

$$U_{veggie5} = \beta_{11} * mean\ veggie\ price + \beta_{13} + \beta_{14} * mean\ Liberal_{S_k} + \beta_{17} * mean\ Liberal_{S_k} + \beta_{19} * mean\ Female_{R_k} + \beta_{20} * mean\ Female_{S_k} + \beta_{23} * mean\ Female_{R_k} * mean\ Female_{S_k}$$

$$\left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 1\right) = \frac{\exp(U_{veggie5})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie5})}$$

When $rec_{veg} = 0, Liberal_{R_{veg}} = 0, rec_{chicken}, rec_{beef} = 0$, and $Liberal_{R_{beef}}, Liberal_{R_{chicken}} = 0$:

$$U_{veggie6} = \beta_{11} * mean\ veggie\ price + \beta_{14} * mean\ Liberal_{S_k} + \beta_{19} * mean\ Female_{R_k} + \beta_{20} * mean\ Female_{S_k} + \beta_{23} * mean\ Female_{R_k} * mean\ Female_{S_k}$$

$$\left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 0\right) = \frac{\exp(U_{veggie6})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie6})}$$

Therefore, $pr\left(y = veggie\ choice \middle| rec_{veg} * Liberal_{R_{veg}}\right) =$

$$pr\langle\left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 1\right) - \left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 0\right) - \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 1\right) + \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 0\right)\rangle =$$

$$pr\left(\frac{\exp(U_{veggie3})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie3})} - \frac{\exp(U_{veggie4})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie4})} - \frac{\exp(U_{veggie5})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie5})} + \frac{\exp(U_{veggie6})}{\exp(U_{beef3}) + \exp(U_{chicken3}) + \exp(U_{veggie6})}\right)$$

Appendix D.1.3 Effect of the Interaction with Three Terms (Triple Difference)

Moreover, the model has the interaction with three terms. For instance, the effect of the interaction between recommendation of vegetarian product, the respondent's and dining

companion's political orientation is:

$$
\begin{aligned}
&pr\left(y = veggie\ choice \middle| rec_{veg} * Liberal_{R_{veg}} * Liberal_{S_{veg}}\right) \\
&\quad = pr\,\langle\{\left[\left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 1\right)\right. \\
&\quad \left. - \left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 0\right)\right] \\
&\quad - \left[\left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 1\right)\right. \\
&\quad \left. - \left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 0\right)\right]\} \\
&\quad - \{\left[\left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 1\right)\right. \\
&\quad \left. - \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 0\right)\right] \\
&\quad - \left[\left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 1\right)\right. \\
&\quad \left. - \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 0\right)\right]\}\rangle \\
&= pr\,\langle\left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 1\right) \\
&\quad - \left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 0\right) \\
&\quad - \left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 1\right) \\
&\quad + \left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 0\right) \\
&\quad - \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 1\right) \\
&\quad + \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 1, Liberal_{S_{veg}} = 0\right) \\
&\quad + \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 1\right) \\
&\quad - \left(y = veggie\ choice \middle| rec_{veg} = 0, Liberal_{R_{veg}} = 0, Liberal_{S_{veg}} = 0\right)\rangle
\end{aligned}
$$

The steps are similar to the interaction with two terms, and the difference is replacing the value of the dining companion's political orientation in vegetarian, beef, and chicken equations.

Appendix D.2 Binary Logit Model Examples

Examples are based on the *Side Dish Choice Model with Interaction Terms*.

$$
\begin{aligned}
U_{healthyside} = {} & \beta_{58} + \beta_{59} * rec_{healthside} + \beta_{60} * health_R + \beta_{61} * health_S + \beta_{62} * rec_{healthside} \\
& * health_R + \beta_{63} * rec_{healthside} * health_S + \beta_{64} * health_s * health_R + \beta_{65} \\
& * rec_{healthside} * health_R * health_S + \beta_{66} * Female_R + \beta_{67} * Female_S + \beta_{68} \\
& * rec_{healthside} * Female_R + \beta_{69} * rec_{healthside} * Female_S + \beta_{70} * Female_R \\
& * Female_S + \beta_{71} * rec_{healthside} * Female_R * Female_S + \beta_{72} * Educ_R + \beta_{73} \\
& * educ_{R_{prefer\ not\ to\ say}} + \beta_{74} * income_R + \beta_{75} * income_{R_{prefer\ not\ to\ say}} + \varepsilon
\end{aligned}
$$

$$
pr(y = healthy\ side) = \frac{\exp\left(U_{healthyside}\right)}{1 + \exp\left(U_{healthyside}\right)}
$$

Appendix D.2.1 Effect of a single variable

When a variable's value changes from 0 to 1, this change will affect food choice.
For example, the effect of the recommendation of the healthy food is:

$effect\ of\ rec_{healthside} = pr(y = healthy\ food|rec_{healthside} = 1) -$
$pr(y = healthy\ food|rec_{healthside} = 0)$
When $rec_{healthside} = 1$,

$$U_{healthyside1} = \beta_{58} + \beta_{59} + \beta_{60} * mean\ health_R + \beta_{61} * mean\ health_S + \beta_{62} * mean\ health_R + \beta_{63} * mean\ health_S + \beta_{64} * mean\ health_s * mean\ health_R + \beta_{65} * mean\ health_R * mean\ health_S + \beta_{66} * mean\ Female_R + \beta_{67} * mean\ Female_S + \beta_{68} * mean\ Female_R + \beta_{69} * mean\ Female_S + \beta_{70} * mean\ Female_R * mean\ Female_S + \beta_{71} * mean\ Female_R * mean\ Female_S + \beta_{72} * mean\ Educ_R + \beta_{73} * mean\ educ_{R_{prefer\ not\ to\ say}} + \beta_{74} * mean\ income_R + \beta_{75} * mean\ income_{R_{prefer\ not\ to\ say}}$$

$$pr(y = healthy\ food|rec_{healthside} = 1) = \frac{\exp\ (U_{healthyside}1)}{1 + \exp\ (U_{healthyside}1)}$$

When $rec_{healthside} = 0$,

$$U_{healthyside2} = \beta_{58} + \beta_{60} * mean\ health_R + \beta_{61} * mean\ health_S + \beta_{64} * mean\ health_s * mean\ health_R + \beta_{66} * mean\ Female_R + \beta_{67} * mean\ Female_S + \beta_{70} * mean\ Female_R * mean\ Female_S + \beta_{72} * mean\ Educ_R + \beta_{73} * mean\ educ_{R_{prefer\ not\ to\ say}} + \beta_{74} * mean\ income_R + \beta_{75} * mean\ income_{R_{prefer\ not\ to\ say}}$$

$$pr(y = healthy\ food|rec_{healthside} = 0) = \frac{\exp\ (U_{healthyside}2)}{1 + \exp\ (U_{healthyside}2)}$$

$$effect\ of\ rec_{healthside} = pr(y = healthy\ food|rec_{healthside} = 1) - pr(y = healthy\ food|rec_{healthside} = 0) = \frac{\exp(U_{healthyside}1)}{1+\exp(U_{healthyside}1)} - \frac{\exp\ (U_{healthyside}2)}{1+\exp\ (U_{healthyside}2)}$$

Appendix D.2.2 Effect of the Interaction with Interaction Terms

The binary logit models use the similar calculation methods as the multinomial logit model (double difference and triple difference) but with the different equations.

For example, in *4.1.2,* when $rec_{veggie} = 1, liberal_R = 1$, the probability is:

$$pr\left(y = veggie\ choice \middle| rec_{veg} = 1, Liberal_{R_{veg}} = 1\right) = \frac{\exp(U_{veggie3})}{\exp(U_{beef3})+\exp(U_{chicken3})+\exp(U_{veggie3})}$$

However, in the binary logit model, when $rec_{healthside} = 1, female_R = 1$, the utility function and probability are:

$$U_{healthyside3} = \beta_{58} + \beta_{59} + \beta_{60} * mean\ health_R + \beta_{61} * mean\ health_S + \beta_{62} * mean\ health_R + \beta_{63} * mean\ health_S + \beta_{64} * mean\ health_s * mean\ health_R + \beta_{65} * mean\ health_R * mean\ health_S + \beta_{66} + \beta_{67} * mean\ Female_S + \beta_{68} + \beta_{69} * mean\ Female_S + \beta_{70} * mean\ Female_S + \beta_{71} * mean\ Female_S + \beta_{72} * mean\ Educ_R + \beta_{73} * mean\ educ_{R_{prefer\ not\ to\ say}} + \beta_{74} * mean\ income_R + \beta_{75} * mean\ income_{R_{prefer\ not\ to\ say}}$$

$$pr(y = healthy\ food|rec_{healthside} = 1, gender_R = 1) = \frac{\exp(U_{healthyside3})}{1+\exp(U_{healthyside3})}$$

APPENDIX E: Regression Results of Food Values

Safety	Log pseudolikelihood = -1724.4982
$gender_R$	0.0808 (0.18)
$Liberal_R$	-0.117 (0.11)
$educ$	0.0255 (0.060)
$income$	-0.0246 (0.039)
Taste	Log pseudolikelihood = -1724.4982
$gender_R$	-0.505 (0.17)***
$Liberal_R$	0.248 (0.11)**
$educ$	-0.0112 (0.038)
$income$	-1.023 (0.34)
Nutrition	Log pseudolikelihood = -1558.1706
$gender_R$	0.573 (0.19)***
$Liberal_R$	-0.125 (0.11)
$educ$	0.0271 (0.067)
$income$	0.0775 (0.039)*

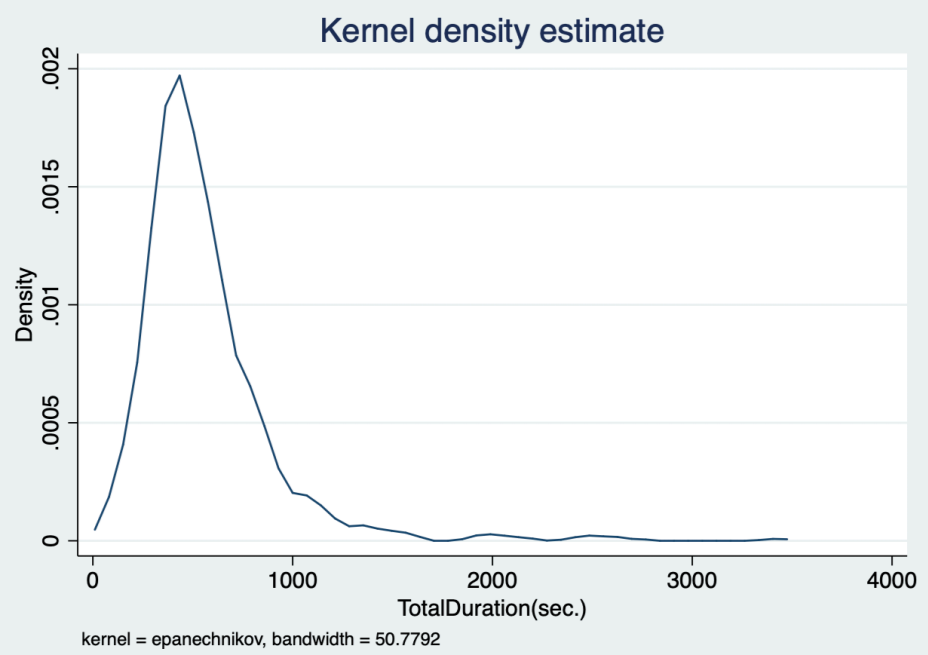
* is 1% critical value
** is at 5% critical value
*** is at 10% critical value

APPENDIX F: Summary of Respondents' Time to Complete the Survey

Summary Table:

Total Duration (in seconds)	
Mean	560.1333
Std. Dev.	338.7071
Minimum	61
Maximum	3424

Kernel Density Map:



APPENDIX G: Confidence Interval Check

Table 7.1: Confidence Interval

Variable	*Obs*	*Mean*	*Std. Err.*	*[95% Conf. Interval]*
$Rec_{vegetarian}$	803	0.2901619	0.0160255	.2587049 .3216188
Rec_{beef}	803	0.3524284	0.0168691	.3193156 .3855412
$Rec_{chicken}$	803	0.0734745	0.0092132	.0553897 .0915593
$Rec_{healthy\ side}$	803	0.3536737	0.0168826	.3205344 .3868131
$Liberal_R$	803	0.0560399	0.0292365	-.0013492 .1134289
$Liberal_S$	803	-0.0099626	0.0265488	-.062076 .0421507
$Female_R$	803	0.501868	0.0176555	.4672116 .5365244
$Female_S$	803	0.50934	0.0176525	.4746894 .5439906
$health_R$	803	0.6762142	0.0274657	.622301 .7301274
$health_S$	803	0.2141968	0.0144869	.18576 .2426335
$Liberal_R * Liberal_S$	803	-0.003736	0.0221158	-0.0471477 0.0396757
$Female_R * Female_S$	803	0.252802	0.0153469	0.2226771 0.2829268
$Rec_{veg} * Liberal_S$	803	-0.0747198	0.0160316	-0.1061886. -0.043251
$Rec_{veg} * Liberal_R$	803	0.0236613	0.0158873	-0.0075243. 0.0548468
$Rec_{veg} * Liberal_R * Liberal_S$	803	-0.0099626	0.0136459	-0.0367485. 0.0168232
$Rec_{veg} * Female_S$	803	0.2216687	0.0146672	0.1928781. 0.2504594
$Rec_{veg} * Female_R$	803	0.1444583	0.0124138	0.1200909. 0.1688257
$Rec_{veg} * Female_R * Female_S$	803	0.1083437	0.0109752	0.0868002. 0.1298873
$Rec_{beef} * Liberal_S$	803	0.1382316	0.018043	0.1028145. 0.1736487
$Rec_{beef} * Liberal_R$	803	0.0099626	0.0171728	-0.0237463. 0.0436716
$Rec_{beef} * Liberal_R * Liberal_S$	803	0.0211706	0.0153953	-0.0090493. 0.0513905
$Rec_{beef} * Female_S$	803	0.2141968	0.0144869	0.18576 0.2426335
$Rec_{beef} * Female_R$	803	0.1681196	0.0132054	0.1421983 0.1940408
$Rec_{beef} * Female_R * Female_S$	803	0.0983811	0.0105167	0.0777375 0.1190246
$Rec_{chicken} * Liberal_S$	803	-0.0734745	0.0092132	-0.0915593. -0.0553897
$Rec_{chicken} * Liberal_R$	803	0.014944	0.0080584	-0.0008741. 0.0307621
$Rec_{chicken} * Liberal_R * Liberal_S$	803	-0.014944	0.0080584	-0.0307621. 0.0008741

$Rec_{chicken} * Female_S$	803	0.0734745	0.0092132	0.0553897.	0.0915593
$Rec_{chicken} * Female_R$	803	0.0460772	0.0074031	0.0315455.	0.0606089
$Rec_{chicken} * Female_R * Female_S$	803	0.0460772	0.0074031	0.0315455.	0.0606089

Table 7.2: Marginal Effects of Model (1)[13] with Confidence Interval

	Beef	**Confidence Interval**	**Vegetarian**	**Confidence Interval**
$recommendation$	.0218 (0.020)	(-0.0174, 0.061)	.0415 (0.029)	(-0.01534, 0.09834)
$Liberal_R$	-.0113 (0.012)	(-0.03482, 0.01222)	.0469 (0.022)*	(0.00378, 0.09002)
$Liberal_S$	-.0143 (0.014)	(-0.04174, 0.01314)	-.0201 (0.021)	(-0.06126, 0.02106)
$Liberal_R * Liberal_S$	.00578 (0.016)	(-0.02558, 0.03714)	-.0222 (0.025)	(-0.07120, 0.02680)
$Female_R$	-.105 (0.020)***	(-0.1442, -0.06580)	.0708 (0.037)*	(-0.00172, 0.14332)
$Female_S$	.00190 (0.020)	(-0.03730, 0.04110)	-.0287 (0.031)	(-0.08946, 0.03206)
$Female_R * Female_S$	-.0174 (0.040)	(-0.09580, 0.0610)	-.0859 (0.060)	(-0.2035, 0.0317)
$Liberal_R * recommendation$	-.0388 (0.027)	(-0.09172, 0.01412)	-.0104 (0.028)	(-0.06528, 0.04448)
$Liberal_S * recommendation$	.0448 (0.031)	(-0.01596, 0.10556)	-.126 (0.039)***	(-0.2024, -0.04956)
$Liberal_R * liberal_S * recommendation$	.0310 (0.046)	(-0.05916, 0.1212)	-.0268 (0.041)	(-0.1072, 0.05356)
$Female_R * recommendation$	-.00444 (0.044)	(-0.09068, 0.08180)	-.0103 (0.054)	(-0.1161, 0.09554)
$Female_S * recommendation$	.0759 (0.055)	(-0.0319, 0.1837)	.188 (0.059)***	(0.07236, 0.3036)
$Female_R * Female_S * recommendation$	-.0222 (0.087)	(-0.1927, 0.1483)	-.0109 (0.10)	(-0.2069, 0.1851)

As *Table 7.1* shows, the confidence interval of interaction terms includes the hypothesized value, so the result is not statistically significant. In *Table 7.2*, marginal effects

[13] *** 1% critical value
** 5% critical value
* 10% critical value

show how social identity and interaction affects the probability of food choice. The expected result is that people are more likely to choose the recommended product if the recommender is from the same group as them, so the expected marginal effect is positive. However, only the interaction term between the recommendation of beef product and political orientation has a positive marginal effect (0.0310), and other interaction terms' marginal effects are negative. For example, the explanation of the interaction between recommendation and gender is that if the vegetarian (beef) product is recommended by a female dining companion, women are 1.09% (2.22%) less likely to choose it, compared with men. Also, the upper end of the confidence interval in *Table 7.2* is not large enough to precisely determine the economic significance.