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Student Research Report

# The Impact of Order Effects of Ingredient and Price on People's Choices of Minimally Processed Food

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# **The Impact of Order Effects of Ingredient and Price on People's Choices of Minimally Processed Food**

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## **Executive Summary**

This experiment explored the influence of the presentation order of price and ingredients of food items on individuals' preference for minimally processed foods. We hypothesized that participants exposed to ingredients first would be more likely to purchase minimally processed foods compared to participants exposed to prices first. We recruited a total of 260 participants and after excluding incomplete survey respondents, our final sample size was 199 participants (143 females, 43 males, 9 non-binary, and 4 preferred not to say). Our independent variable was the order in which participants saw the price or ingredients of food items. Participants completed our UBC Qualtrics online survey which included two groups: ingredients first (experimental group) and price first (control group). The items examined were: Soy Sauce, Peanut Butter, Brownies, Vegetable Soup, and Strawberry Jam. We conducted a Chi-Square Test of Independence and used the forced-choice question "Which of these two items are you most likely to buy?" to measure our dependent variable which was their preference for minimally processed foods. Unfortunately, there was no significant difference across conditions: our results did not support our hypothesis. We speculate on potential causes for our null findings and provide our clients with recommendations for future studies.

**Keywords:** minimally processed food; highly processed food; order effect; ingredients of food; price of food.

## **Introduction**

Grocery shopping is a routine activity for most people, and factors influencing food choices have been thoroughly investigated (Chiam et al., 2021). Past studies have found that these determinants include price, taste and freshness of foods, along with cognitive influences, and socio-cultural pressures (e.g. perceived stress, anxiety and depression, and attitudes toward health). Research suggests that the order effect, that is, altering the order in which information is presented may affect choices (Leng et al., 2017). To our knowledge, no studies have examined the order effect of making ingredients more salient than price, on decision-making. To improve people's health by changing their dietary choices, it may be worth understanding the order effect of food choices (Leng et al., 2017).

Previous literature has established that consumers prioritize the taste of food above all factors (Chiam et al., 2021). Lusk and Briggeman (2009) further demonstrated that cost, nutritional value and safety of food items are factors of equal importance to consumers. Another study found that the distance between food origin and sales place has gradually become a key consideration, with consumers' increasing willingness to pay for local food (Grebitus and Nayga, 2013). Although the origin of food was classified as the "least important factor" (Lusk and Briggeman, 2009), it is worth emphasizing that the origin of different kinds of food will have different degrees of influence on consumers. Grebitus, Lusk and Nayga (2013) compared apples to wine in their study. Their results show that for minimally processed foods such as apples, consumers prefer local foods because shorter distance is often associated with freshness and better taste. When it comes to highly processed foods like wine, distance becomes less important.

Highly processed foods are defined as generally ready-to-eat; they typically contain synthetic ingredients (e.g. artificial coloring and flavoring agents, preservatives) and excessive amounts of salt, sugar or fat. Examples include sugary drinks, some cookies, potato chips, and breakfast cereals (The President and Fellows of Harvard College, 2022). Minimally processed foods are defined as foods that are naturally edible, or made with fresh ingredients and are nutritionally dense (The President and Fellows of Harvard College, 2022); with few or no additives (Bansal, Siddiqui and Rahman, 2015). Typical examples are fresh vegetables and fruits, meat, milk, nuts, but also include foods prepared at home.

The rise in sales of heavily processed foods may be related to the rise in obesity rates (Monteiro et al., 2018). Furst et al (1996) explained how the environment, culture, and society of individuals along with the resources to which they have access will influence their ideals. These factors shape their mental framework, including the unconscious choices made when choosing food. Julie et al. (2005) presented a very intuitive and interesting example: comfort foods. Such foods are eaten when people feel sad, depressed, or lonely. Hence, foods that can make people feel relaxed, provide comfort, and change their emotional state and feelings have become the choice of predilection of consumers.

However, we found that among these established influencing factors, few studies mentioned the influence of food ingredients on consumer food choices. Therefore, the research question we posed was: how does the presentation order of price and ingredients of food items influence the choice of minimally vs. highly processed foods? Based on our everyday habits and choices, we hypothesized that participants exposed to ingredients first would be more likely to purchase minimally processed foods compared to participants exposed to prices first.

## **Methods**

### ***Participants***

Our study aimed to recruit 197 participants with an effect size of 0.2 and a power of 0.8 from our G-power analysis. We were able to recruit 260 participants and after excluding incomplete survey respondents, our final sample size was 199 participants ( $N= 199$ ,  $Mage = 23.5$ ,  $SDage = 7.36$ ). We had 143 female, and 43 male participants, 9 non-binary/third gender, and 4 who preferred not to disclose their gender identity. Our subject pool consisted of 58.9% UBC students, 19.58% students from other universities, 10% working professionals, and 22.61% unspecified others. Finally, 28.64% of our participants had dietary restrictions. (See Appendix 1)

### ***Conditions***

After consulting our SEEDS clients we decided to test how the order effect influences individuals' selection of food items. Our independent variable was the order of presentation of the price and ingredients of the paired products. We had a total of five identical pairs of food items carefully chosen by taking our clients' interests into consideration: Soy Sauce, Peanut Butter, Brownie, Vegetable Soup and Strawberry Jam, all of which are sold at the UBC's Foodhub Market. We put these food items in two conditions consisting of ingredients-first or price-first conditions respectively and created pairs of equivalent food items made of highly versus minimally processed ingredients. We hypothesized that participants exposed to the ingredients list first would intend to purchase minimally processed food options.

### ***Measures***

Our study is a between-subject design with our dependent variable being the participants' choice to purchase minimally or highly processed foods, which was collected through an online survey. The experiment lasted less than 5 minutes, with participants being randomly assigned to one of two sets of questions, corresponding to two conditions. The survey consisted of two sections with a total of 9 questions. We designed a forced-choice question to gain a clear understanding of the potential of the order effect to steer decision-making toward minimally processed foods in our experimental condition and avoid ambiguous results. Additionally, we alternated left and right the side on which highly or minimally processed items were shown to avoid a side-preference bias in both conditions.

## ***Procedure***

Our survey was designed using the UBC Qualtrics for data collection that generated our survey link and QR code. Prior to the questionnaire, individuals were required to read and give their consent to participate. Participants were then randomly assigned to one of two different conditions: price-first (control group) or ingredients-first (experimental group). Participants were asked to carefully read the information provided and make a choice between two options for five questions inquiring about their preference to purchase minimally or highly processed foods. Section 1 (question 1-5) consisted of our 5 food items where participants chose either minimally or highly processed food item by using the forced-choice question “Which of these two items are you most likely to buy?”. Section 2 (questions 6-9) consisted of demographic questions such as gender, age, occupation, and dietary restrictions. Understanding the participants' background information was crucial to determine the generalizability of our study. We used social media platforms, UBC Nest and Orchard Commons to collect our subject pool along with a poster of our QR code on the bulletin board in Kenny.

## ***Results***

In order to test our hypothesis, we analyzed our data using the chi-square test of independence ( $\chi^2$ ). The total frequencies of people's preference for minimally and highly processed options for all five items are shown in Appendix Figure 3.7. The calculations revealed that at  $p < 0.05$ , there was no significant relationship between the presentation order of price or ingredients first and participants' choice of highly processed or minimally processed items  $\chi^2 = 0.2636, p = 0.6076$  (see Appendix Figure 3.1). Participants in the ingredient-first condition did not show a difference in their preference for minimally processed food (306) when compared to the participants in the price-first group (317), which did not support our hypothesis.

Participants' likelihood of choosing either highly or minimally processed food on every single food item was also tested as illustrated in Appendix 3, Figure 3.8-3.12. For the Soy Sauce group (see Appendix 3, Figure 3.2 and Figure 3.8),  $\chi^2 = 0.836, p = 0.3605$ . Although the chi-square value of Soy Sauce was the highest compared to other food items, it was still not significant at  $p < 0.05$ . For Peanut Butter ( $\chi^2 = 0.0403, p = 0.8409$ , see Appendix 3 Figure 3.9 and Figure 3.3), results were not significant. For the Brownie group, ( $\chi^2 = 0.6188, p = 0.4315$ , see Appendix 3, Figure 3.10 and Figure 3.4), no significant relationship was observed. As demonstrated in Appendix Figure 3.12, we have the weakest relationship for Vegetable Soup ( $\chi^2 = 0.0024, p = 0.9606$ , see Appendix 3, Figure 3.5). For Strawberry Jam ( $\chi^2 = 0.6888, p = 0.4065$ , see Appendix 3 Figure 3.6 and 3.11.), again no significance at  $p < 0.05$ . Therefore, for both conditions, our results suggested the manipulation of presentation order of ingredients and price did not have a significant impact on participant's choice, which implies our data does not support our hypothesis. (see Appendix Figure 3.7-3.12)

More than half of our participants were UBC students (see Appendix Figure 1.2). Thus, additional analysis for the order effects of presenting ingredients or price first on UBC students' food choices was conducted. There were no significant differences in UBC students' choices whether they were in the ingredient-first or price-

first condition when adding responses of all five items together ( $\chi^2 = 0.3135, p=0.5755$ , see Appendix Figure 4.1). In addition, we also examined the frequencies of students' responses of their preference for each item, including soy sauce ( $\chi^2 = 1.1174, p = 0.2905$ ), peanut butter ( $\chi^2 = 0.0025, p = 0.9602$ ), brownie ( $\chi^2 = 1.2775, p = 0.2584$ ), vegetable soup ( $\chi^2 = 0.3290, p = 0.5663$ ), and strawberry jam ( $\chi^2 = 2.4748, p = 0.115685$ , see Appendix Figure 4.2-4.6) The relationship between the presentation order of peanut butter and students' intention to purchase highly or minimally processed food was the weakest among all 5 food items, while the strongest relationship was for strawberry jam. Despite minor differences in statistics, the results of UBC students only were similar to the results of all participants. Thus, the effect of the order of presenting ingredients or price first on people's food choices was considerably small and not significant.

### Discussion

In this study, we explored the influence of the presentation order of price and ingredients of food items on individuals' preference for minimally processed foods and found our manipulation had no impact on their decision-making. The results we obtained may be explained by a number of factors. First, the pair of ingredient lists for the strawberry jam were likely too similar in composition (see Appendix 2); a stronger manipulation would perhaps have yielded a significant difference between groups for this item.

Furthermore, as humans have a natural inclination toward sweet-tasting foods (Beauchamp, 2016), the highly processed peanut butter may have been perceived as more palatable by many due to the presence of sugar, which was not an ingredient in the minimally processed counterpart. This explanation is viable given the minor difference in cost of the two items (\$0.58). Moreover, a small but non-negligible segment of participants had dietary restrictions for gluten (3.9%), dairy (9.7%), and nuts (3.9%) or indicated being vegan (4.8%) all of which acted as confounding variables for our findings on both the peanut butter food and brownie options. In the future it may be worth examining foods with low-allergen potential to obtain significance, along with assessing the need for more allergen-friendly options on campus.

It is possible that excluding other factors (e.g. brand, attractive packaging, freshness, nutritional value) normally present in a grocery store environment, gave participants an opportunity to pay more attention to the ingredients list regardless of the condition they were in. Under this assumption, it is plausible that the increased salience of ingredient lists alone encouraged participants to make better choices for their health, provided they already had the necessary knowledge to recognize harmful ingredients. Having a third condition, where the price and ingredients were shown at once might have helped us understand if this was the case. That being said, over 40% of UBC students opted for highly processed items across conditions. More investigation is needed to understand students' greater inclination for highly processed foods to determine whether it is due to a lack of food literacy or limited financial means. This could be done by testing whether findings remain consistent when the cost of items is the same for both options.

Our study looked at three condiments (Soy Sauce, Peanut Butter and Strawberry Jam), which by definition are flavor-enhancing agents (Merriam-Webster, 2023), used in relatively small amounts since they are not stand-alone foods. The fact that the majority of our participants favored minimally processed options despite their higher cost contradicts previous literature suggesting that consumers tend to prioritize cost rather than quality when it comes to condiments (International Markets Bureau, 2011). However, when examining the responses of UBC students only, there was overall a slightly higher percentage of people choosing highly processed options across conditions (See Appendix 4). This is especially pronounced when looking at soy sauce (see Appendix 3, Image 3.2 and Appendix 4, for comparison) and suggests that UBC students may put more importance on cost than quality, unlike the rest of our participants.

Finally, our findings are limited in its generalizability as it lacks the realism of a grocery store environment, in which people usually have more cues indicating how truly processed a product is. Additionally, participants may not have considered buying such items if they weren't forced to do so, for reasons as varied as existing dietary restrictions and the socio-cultural insignificance of the proposed food items.

### **Recommendations for your UBC client**

Due to insignificant findings, we are limited in our ability to make recommendations for our UBC client. Instead we propose topics of investigation that may produce significant results next year. As mentioned in our discussion, the level of food literacy amongst the student body is unknown and requires more investigation. Additionally, it may be worth experimenting with increasing the salience of the ingredient list to see if this single factor steers students' food choices toward forwards with greater health benefits. This could be achieved by testing the impact of having comparison charts of equivalent products or using a variety of attractive labels (experimenting with color and font size for example). Previous studies have found that gentle nudges in the form of posters or green stickers are effective in increasing undergraduates' consumption of fruits and vegetables (see, Vermote et al, 2020 for ideas). Moreover, future groups could examine whether food choices are caused by financial limitations and investigate the type of students would select when cost is not a barrier (i.e. which item is chosen when both cost the same?). Lastly, as our demographic statistics revealed that 28.64% of our participants had allergies, it could be relevant for the Food Hub to investigate how to better serve this population.

### **References**

- Beauchamp G. K. (2016). Why do we like sweet taste: A bitter tale?. *Physiology & behavior*, 164(Pt B), 432–437. <https://doi.org/10.1016/j.physbeh.2016.05.007>
- Chiam, F., Pei, T., Yao, A., Zhong, J., & Zou, J. (2021). *Uncovering Determinant Factors in Food Choice*. University of British Columbia Social Ecological Economic Development Studies (SEEDS) Sustainability Program.



- Furst, T., Connors, M., Bisogni, C.A., Sobal, J. & Falk, L. W. (1996). Food Choice: A conceptual model of the process. *Appetite*, 26(3), 247-266.  
<https://doi.org/10.1006/appe.1996.0019>
- Grebitus, C., Lusk, J. L., & Nayga, R. M. (2013). Effect of distance of transportation on willingness to pay for food. *Ecological Economics*, 88, 67-75.  
<https://doi.org/10.1016/j.ecolecon.2013.01.006>
- The President and Fellows of Harvard College (2022). *Food Processing and Health*. Harvard School of Public Health.  
<https://www.hsph.harvard.edu/nutritionsource/processed-foods/>
- Leng, G., Adan, R. A. H., Belot, M., Brunstrom, J. M., de Graaf, K., Dickson, S. L., Hare, T., Maier, S., Menzies, J., Preissl, H., Reisch, L. A., Rogers, P. J., Smeets, P. A. M., Sahlgrenska akademien, Göteborgs universitet, Gothenburg University, Institute of Neuroscience and Physiology, Department of Physiology, Institutionen för neurovetenskap och fysiologi, sektionen för fysiologi, & Sahlgrenska Academy. (2017). The determinants of food choice. *Proceedings of the Nutrition Society*, 76(3), 316-327. <https://doi.org/10.1017/S002966511600286X>
- Locher, J. L., Yoels, W. C., Maurer, D., & van Ells, J. (2005). Comfort foods: An exploratory journey into the social and emotional significance of food. *Food & Foodways*, 13(4), 273-297. <https://doi.org/10.1080/07409710500334509>
- Lusk, J. L., & Briggeman, B. C. (2009). Food values. *American Journal of Agricultural Economics*, 91(1), 184-196. <https://doi.org/10.1111/j.1467-8276.2008.01175.x>
- International Markets Bureau (2011). Consumer Trends: Sauces, Dressings and Condiments in the United States [Market Indicator Report]. Agriculture and Agri-Food Canada  
[https://publications.gc.ca/collections/collection\\_2012/agr/A74-1-41-2011-eng.pdf](https://publications.gc.ca/collections/collection_2012/agr/A74-1-41-2011-eng.pdf)
- Monteiro, C. A., Cannon, G., Moubarac, J., Levy, R. B., Louzada, M. L. C., & Jaime, P. C. (2018). The UN decade of nutrition, the NOVA food classification and the trouble with ultra-processing. *Public Health Nutrition*, 21(1), 5-17.  
<https://doi.org/10.1017/S1368980017000234>
- Siddiqui, M. W., & Rahman, M. S. (2015). Minimally processed foods: Overview. *Minimally processed foods* (pp. 1-15). Springer International Publishing AG.  
[https://doi.org/10.1007/978-3-319-10677-9\\_1](https://doi.org/10.1007/978-3-319-10677-9_1)

Vermote, M., Nys, J, Versele, V., D'Hondt, E., Deforche, B., Clays, P. & Deliens, T. () The effect of nudges aligned with the renewed Flemish Food Triangle on the purchase of fresh fruits: An on-campus restaurant experiment. *Appetite* 144(1), 104479. <https://doi.org/10.1016/j.appet.2019.104479>

## Appendix

### Appendix 1: Demographic results

Figure

1.1

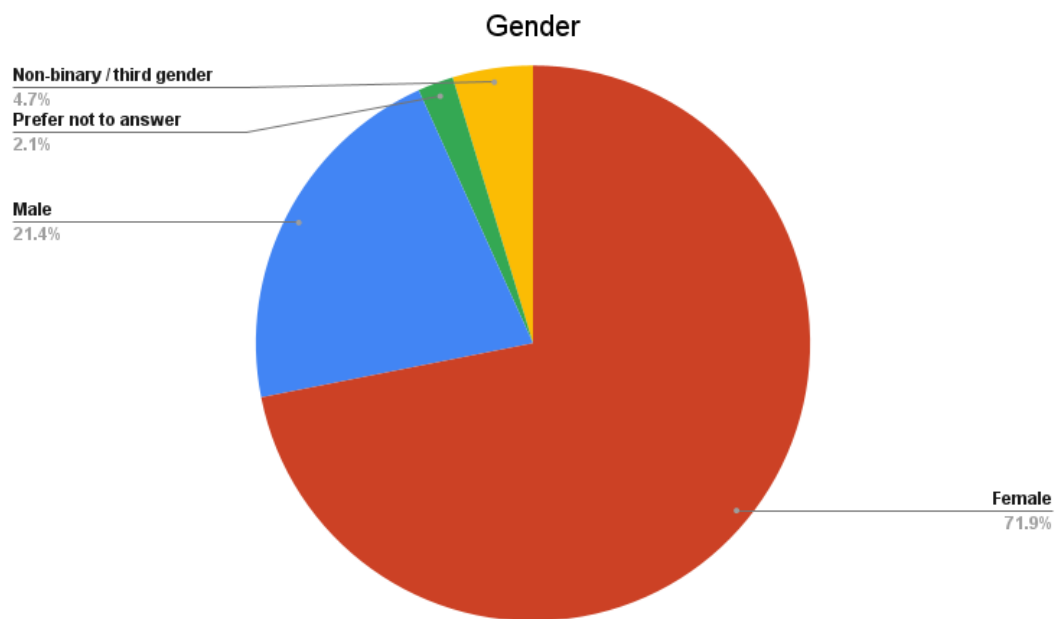


Figure 1.2

## Occupation

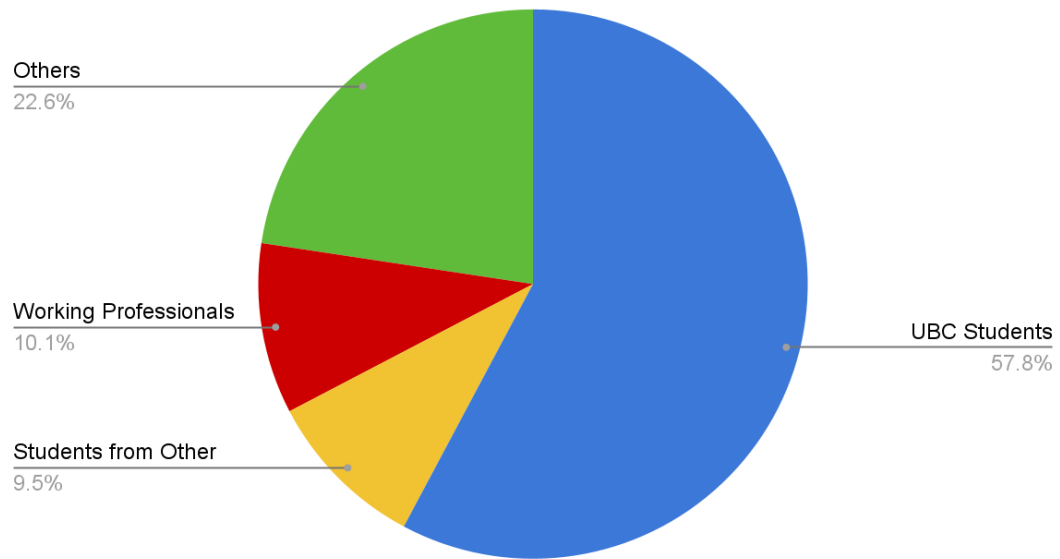
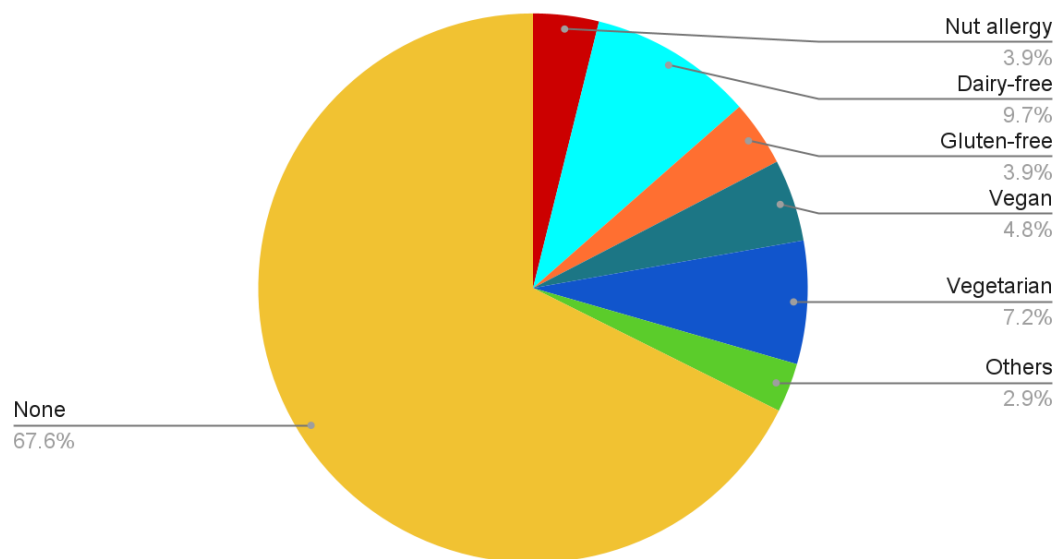


Figure 1.3

## Dietary Restrictions



***Price-first  
condition:***

Please carefully read the information of each item and make a choice between the following two items.

**Product: Soy Sauce**

Option 1



**\$1.71/450 ml**

Option 2



**\$5.66/450 ml**

Please carefully read the information of each item and make a choice between the following two items.

**Product: Soy Sauce**

Option 1



**\$1.71/450 ml**

**Ingredients:** Water, Hydrolyzed soy protein, Sugar, Salt, Caramel colour, Lactic acid, Sodium benzoate.

Option 2



**\$5.66/450 ml**

**Ingredients:** Water, Soybeans, Wheat, Salt.

Which of the two items are you most likely to purchase?

Option 1

Option 2

Please carefully read the information of each item and make a choice between the following two items.

Product: **Peanut Butter**

Option 1



**\$4.59/500g**

Option 2



**\$4.01/500g**

Please carefully read the information of each item and make a choice between the following two items.

Product: **Peanut Butter**

Option 1



**\$4.59/500g**

**Ingredients:** Peanuts, Salt.

Option 2



**\$4.01/500g**

**Ingredients:** Select Roasted Peanuts, Soybean Oil, Sugars (Corn Maltodextrin, Sugar), Hydrogenated Vegetable Oil (Cottonseed and Rapeseed oil), Salt, Mono- And Diglycerides.

Which of the two items are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

Product: **Brownie**

Option 1



**\$1.13/57g**

Option 2



**\$3.45/57g**

Please carefully read the information of each item and make a choice between the following two items.

Product: **Brownie**

Option 1



**\$1.13/57g**

**Ingredients:** Enriched wheat flour, Corn syrup, Sugar, milk chocolate flavoured chips, Palm and high monounsaturated canola oil, Shortening, Fructose, Cocoa powder, water, sugarcane fibre, Glycerin, Palm and palm kernel oil, canola and soybean oil, Natural flavour, Egg white, Corn starch, Salt, Baking soda, sodium aluminum phosphate, Soy lecithin, Milk powder, Locust bean gum, Xanthan gum, Rosemary extract.

Option 2



**\$3.45/57g**

**Ingredients:** Sugar, Unsalted butter, Semi-sweet chocolate (Cane sugar, Unsweetened chocolate, Cocoa butter), Cacao powder, Flour, Eggs, Vanilla extract, Salt

Which of the two items are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

Product: **Vegetable Soup**

Option 1



**\$2.25/100 ml**

Option 2



**\$1.16/100 ml**

Please carefully read the information of each item and make a choice between the following two items.

**Product: Vegetable Soup**

Option 1



**\$2.25/100 ml**

**Ingredients:** Water, Potatoes, Alphabet pasta (Durum wheat semolina, wheat gluten), Onions, Carrots, Celery, Tomato paste, Green peas, Green beans, Corn, Garlic cloves, Olive oil, Italian seasoning, Bay leaves, Salt, Pepper.

Option 2



**\$1.16/100 ml**

**Ingredients:** Water, Carrots, Tomato paste, Dehydrated potatoes, Green peas, Sugar, Alphabet pasta (durum wheat semolina, wheat gluten), Corn, Green beans, Salt, Canola oil, Corn starch, Monosodium glutamate, Modified corn starch, Barley, Celery, Dehydrated onions, Onion powder, Garlic powder, Spice extract, Spices.

Which of the two item are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

**Product: Strawberry Jam**

Option 1



**\$5.97/300g**

Option 2



**\$3.89/300g**



Please carefully read the information of each item and make a choice between the following two items.

Product: **Strawberry Jam**

Option 1



**\$5.97/300g**

**Ingredients:** Strawberries, glucose-fructose, sugar, pectin, citric acid.

Option 2



**\$3.89/300g**

**Ingredients:** Strawberries, sugar, lemon juice concentrate, pectin.

Which of the two items are you most likely to purchase?

Option 1



Option 2



***Ingredient-First condition:***

Please carefully read the information of each item and make a choice between the following two items.

Product: **Soy Sauce**

Option 1



**Ingredients:** Water, Hydrolyzed soy protein, Sugar, Salt, Caramel colour, Lactic acid, Sodium benzoate.

Option 2



**Ingredients:** Water, Soybeans, Wheat, Salt.

Please carefully read the information of each item and make a choice between the following two items.

**Product: Soy Sauce**

Option 1



**Ingredients:** Water, Hydrolyzed soy protein, Sugar, Salt, Caramel colour, Lactic acid, Sodium benzoate.

**\$1.71/450 ml**

Option 2



**Ingredients:** Water, Soybeans, Wheat, Salt.

**\$5.66/450 ml**

Which of the two items are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

**Product: Peanut Butter**

Option 1



**Ingredients:** Peanuts, Salt.

Option 2



**Ingredients:** Select Roasted Peanuts, Soybean Oil, Sugars (Corn Maltodextrin, Sugar), Hydrogenated Vegetable Oil (Cottonseed and Rapeseed oil), Salt, Mono- And Diglycerides.

Please carefully read the information of each item and make a choice between the following two items.

Product: **Peanut Butter**

Option 1



**Ingredients:** Peanuts, Salt.

**\$4.59/500g**

Option 2



**Ingredients:** Select Roasted Peanuts, Soybean Oil, Sugars (Corn Maltodextrin, Sugar), Hydrogenated Vegetable Oil (Cottonseed and Rapeseed oil), Salt, Mono- And Diglycerides.

**\$4.01/500g**

Which of the two items are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

Product: **Brownie**

Option 1



**Ingredients:** Enriched wheat flour, Corn syrup, Sugar, milk chocolate flavoured chips, Palm and high monounsaturated canola oil, Shortening, Fructose, Cocoa powder, water, sugarcane fibre, Glycerin, Palm and palm kernel oil, canola and soybean oil, Natural flavour, Egg white, Corn starch, Salt, Baking soda, sodium aluminum phosphate, Soy lecithin, Milk powder, Locust bean gum, Xanthan gum, Rosemary extract.

Option 2



**Ingredients:** Sugar, Unsalted butter, Semi-sweet chocolate (Cane sugar, Unsweetened chocolate, Cocoa butter), Cacao powder, Flour, Eggs, Vanilla extract, Salt

Please carefully read the information of each item and make a choice between the following two items.

Product: **Brownie**

Option 1



**Ingredients:** Enriched wheat flour, Corn syrup, Sugar, milk chocolate flavoured chips, Palm and high monounsaturated canola oil, Shortening, Fructose, Cocoa powder, water, sugarcane fibre, Glycerin, Palm and palm kernel oil, canola and soybean oil, Natural flavour, Egg white, Corn starch, Salt, Baking soda, sodium aluminum phosphate, Soy lecithin, Milk powder, Locust bean gum, Xanthan gum, Rosemary extract.

\$2.39/57g

Option 2



**Ingredients:** Sugar, Unsalted butter, Semi-sweet chocolate (Cane sugar, Unsweetened chocolate, Cocoa butter), Cacao powder, Flour, Eggs, Vanilla extract, Salt

\$3.45/57g

Which of the two items are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

Product: **Vegetable Soup**

Option 1



**Ingredients:** Water, Potatoes, Alphabet pasta (Durum wheat semolina, wheat gluten), Onions, Carrots, Celery, Tomato paste, Green peas, Green beans, Corn, Garlic cloves, Olive oil, Italian seasoning, Bay leaves, Salt, Pepper.

Option 2



**Ingredients:** Water, Carrots, Tomato paste, Dehydrated potatoes, Green peas, Sugar, Alphabet pasta (durum wheat semolina, wheat gluten), Corn, Green beans, Salt, Canola oil, Corn starch, Monosodium glutamate, Modified corn starch, Barley, Celery, Dehydrated onions, Onion powder, Garlic powder, Spice extract, Spices.

Please carefully read the information of each item and make a choice between the following two items.

**Product: Vegetable Soup**

Option 1



**Ingredients:** Water, Potatoes, Alphabet pasta (Durum wheat semolina, wheat gluten), Onions, Carrots, Celery, Tomato paste, Green peas, Green beans, Corn, Garlic cloves, Olive oil, Italian seasoning, Bay leaves, Salt, Pepper.

**\$2.25/100 ml**

Option 2



**Ingredients:** Water, Carrots, Tomato paste, Dehydrated potatoes, Green peas, Sugar, Alphabet pasta (durum wheat semolina, wheat gluten), Corn, Green beans, Salt, Canola oil, Corn starch, Monosodium glutamate, Modified corn starch, Barley, Celery, Dehydrated onions, Onion powder, Garlic powder, Spice extract, Spices.

**\$1.16/100 ml**

Which of the two items are you most likely to purchase?

Option 1



Option 2



Please carefully read the information of each item and make a choice between the following two items.

**Product: Strawberry Jam**

Option 1



**Ingredients:** Strawberries, glucose-fructose, sugar, pectin, citric acid.

Option 2



**Ingredients:** Strawberries, sugar, lemon juice concentrate, pectin.

Please carefully read the information of each item and make a choice between the following two items.

Product: **Strawberry Jam**

Option 1



**Ingredients:** Strawberries, glucose-fructose, sugar, pectin, citric acid.

**\$5.97/300g**

Option 2



**Ingredients:** Strawberries, sugar, lemon juice concentrate, pectin.

**\$3.89/300g**

Which of the two items are you most likely to purchase?

Option 1

Option 2

***\*Demographic Questionnaire:***

What is your age? (in years)

What is your gender?

- Male
- Female
- Non-binary / third gender
- Prefer not to answer

What is your occupation?

- UBC Student
- UBC Staff
- Others, please specify:

Do you have any dietary restrictions/allergies?

- Gluten free
- Dairy free
- Vegan
- Nut free (peanuts, tree nuts, walnut, etc)
- Vegetarian
- Others, please specify:
- None

### Appendix 3: Chi-square Calculation and Statistics for All Participants

Figure 3.1

	Highly processed	Minimally processed	Marginal Row Totals
IF Total	188 (191.95) [0.08]	317 (313.05) [0.05]	505
PF Total	194 (190.05) [0.08]	306 (309.95) [0.05]	500
Marginal Column Totals	382	623	1005 (Grand Total)

The chi-square statistic is 0.2636. The  $p$ -value is .607662. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.2011. The  $p$ -value is .653844. Not significant at  $p < .05$ .

Figure 3.2

	Highly processed	Minimally processed	Marginal Row Totals
IF Soy Sauce	44 (47.23) [0.22]	57 (53.77) [0.19]	101
PF Soy Sauce	50 (46.77) [0.22]	50 (53.23) [0.2]	100
<b>Marginal Column Totals</b>	94	107	201 (Grand Total)

The chi-square statistic is 0.836. The  $p$ -value is .360552. *Not significant at  $p < .05$ .*

The chi-square statistic with Yates correction is 0.5974. The  $p$ -value is .439554. *Not significant at  $p < .05$ .*

Figure 3.3

	Highly processed	Minimally processed	Marginal Row Totals
IF Peanut Butter	38 (38.69) [0.01]	63 (62.31) [0.01]	101
PF Peanut Butter	39 (38.31) [0.01]	61 (61.69) [0.01]	100
<b>Marginal Column Totals</b>	77	124	201 (Grand Total)

The chi-square statistic is 0.0403. The  $p$ -value is .840952. *Not significant at  $p < .05$ .*

The chi-square statistic with Yates correction is 0.0031. The  $p$ -value is .955674. *Not significant at  $p < .05$ .*

Figure 3.4

	Highly processed	Minimally processed	Marginal Row Totals
IF Brownie	34 (36.68) [0.2]	67 (64.32) [0.11]	101
PF Brownie	39 (36.32) [0.2]	61 (63.68) [0.11]	100
<b>Marginal Column Totals</b>	73	128	201 (Grand Total)

The chi-square statistic is 0.6188. The  $p$ -value is .43151. *Not significant at  $p < .05$ .*

The chi-square statistic with Yates correction is 0.4095. The  $p$ -value is .52221. *Not significant at  $p < .05$ .*

Figure 3.5



	Highly processed	Minimally processed	Marginal Row Totals
IF Soup	33 (33.16) [0]	68 (67.84) [0]	101
PF Soup	33 (32.84) [0]	67 (67.16) [0]	100
Marginal Column Totals	66	135	201 (Grand Total)

The chi-square statistic is 0.0024. The  $p$ -value is .960665. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.0102. The  $p$ -value is .919646. Not significant at  $p < .05$ .

Figure 3.6

	Highly processed	Minimally processed	Marginal Row Totals
IF Strawberry Jam	39 (36.18) [0.22]	62 (64.82) [0.12]	101
PF Strawberry Jam	33 (35.82) [0.22]	67 (64.18) [0.12]	100
Marginal Column Totals	72	129	201 (Grand Total)

The chi-square statistic is 0.6888. The  $p$ -value is .406559. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.4663. The  $p$ -value is .494699. Not significant at  $p < .05$ .

Figure 3.7

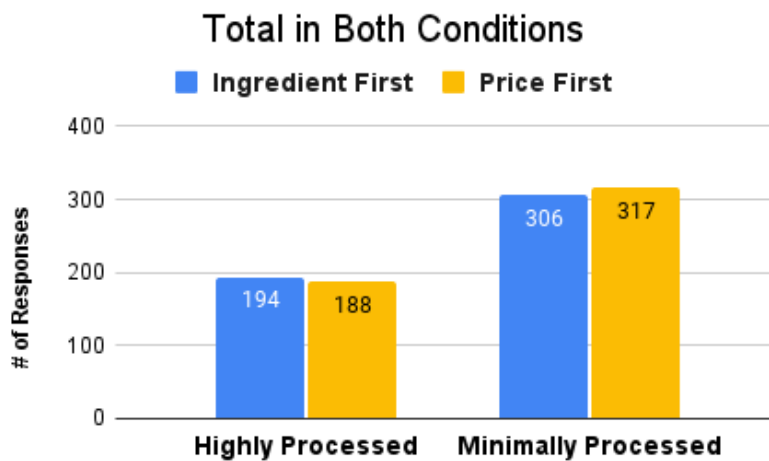


Figure 3.8

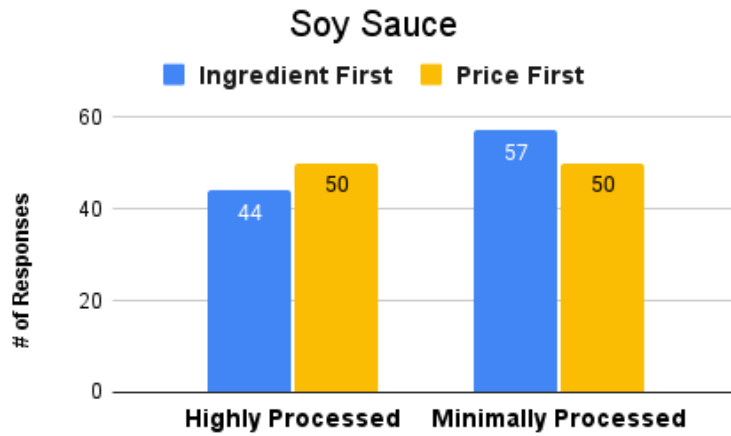


Figure 3.9

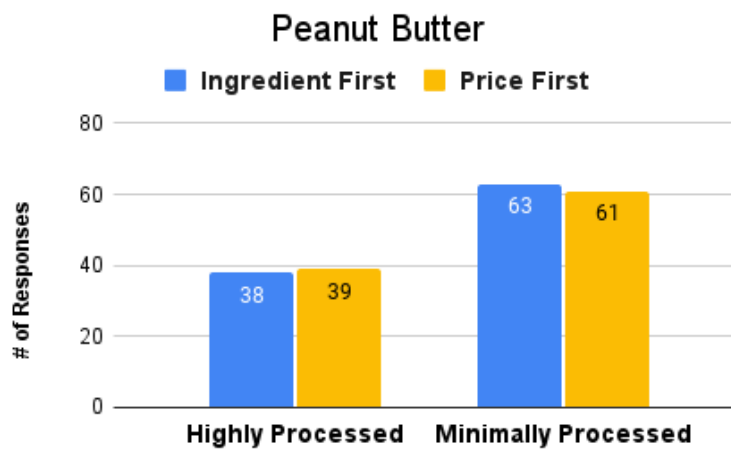


Figure 3.10

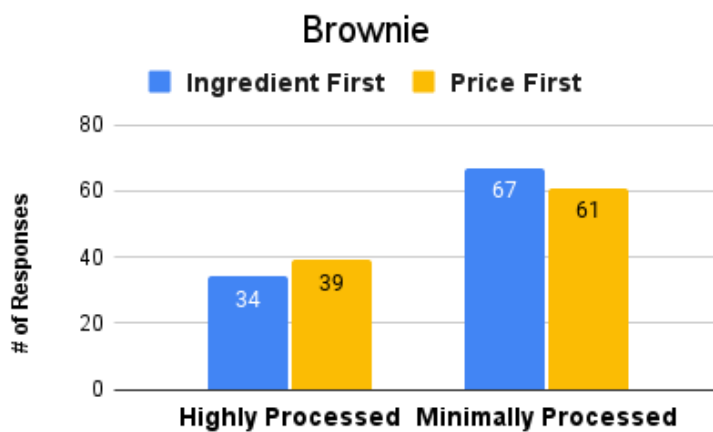


Figure 3.11

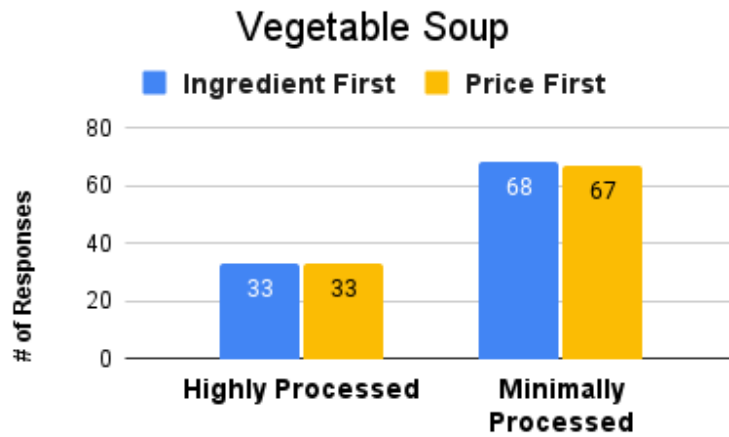
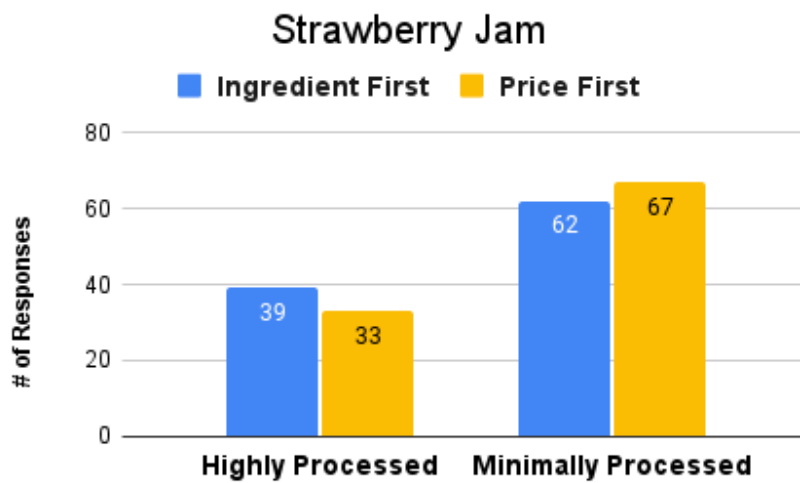


Figure 3.12



#### Appendix 4: Chi-square Calculation for UBC Students

Figure 4.1

	Highly processed	Minimally processed	<i>Marginal Row Totals</i>
IF Total	124 (127.3) [0.09]	181 (177.7) [0.06]	305
PF Total	116 (112.7) [0.1]	154 (157.3) [0.07]	270
<i>Marginal Column Totals</i>	240	335	575 (Grand Total)

The chi-square statistic is 0.3135. The  $p$ -value is .575532. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.2258. The  $p$ -value is .634646. Not significant at  $p < .05$ .

Figure 4.2

	Highly processed	Minimally processed	Marginal Row Totals
IF Soy Sauce	29 (31.83) [0.25]	32 (29.17) [0.27]	61
PF Soy Sauce	31 (28.17) [0.28]	23 (25.83) [0.31]	54
<b>Marginal Column Totals</b>	60	55	115 (Grand Total)

The chi-square statistic is 1.1174. The  $p$ -value is .290469. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.757. The  $p$ -value is .384262. Not significant at  $p < .05$ .

Figure 4.3

	Highly processed	Minimally processed	Marginal Row Totals
IF Peanut Butter	24 (23.87) [0]	37 (37.13) [0]	61
PF Peanut Butter	21 (21.13) [0]	33 (32.87) [0]	54
<b>Marginal Column Totals</b>	45	70	115 (Grand Total)

The chi-square statistic is 0.0025. The  $p$ -value is .960173. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.02. The  $p$ -value is .887484. Not significant at  $p < .05$ .

Figure 4.4

	Highly processed	Minimally processed	Marginal Row Totals
IF Brownie	23 (25.99) [0.34]	38 (35.01) [0.26]	61
PF Brownie	26 (23.01) [0.39]	28 (30.99) [0.29]	54
<b>Marginal Column Totals</b>	49	66	115 (Grand Total)

The chi-square statistic is 1.2775. The  $p$ -value is .25837. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.8861. The  $p$ -value is .346536. Not significant at  $p < .05$ .

Figure 4.5

	Highly processed	Minimally processed	<i>Marginal Row Totals</i>
IF Soup	25 (26.52) [0.09]	36 (34.48) [0.07]	61
PF Soup	25 (23.48) [0.1]	29 (30.52) [0.08]	54
<i>Marginal Column Totals</i>	50	65	115 (Grand Total)

The chi-square statistic is 0.329. The  $p$ -value is .566261. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 0.1483. The  $p$ -value is .700157. Not significant at  $p < .05$ .

Figure 4.6

	Highly processed	Minimally processed	<i>Marginal Row Totals</i>
IF Strawberry Jam	23 (19.1) [0.8]	38 (41.9) [0.36]	61
PF Strawberry Jam	13 (16.9) [0.9]	41 (37.1) [0.41]	54
<i>Marginal Column Totals</i>	36	79	115 (Grand Total)

The chi-square statistic is 2.4748. The  $p$ -value is .115685. Not significant at  $p < .05$ .

The chi-square statistic with Yates correction is 1.8815. The  $p$ -value is .170162. Not significant at  $p < .05$ .

### PSYC 421 Whole Project Contributions

Our group worked collaboratively throughout the entire project. We held consistent online and in-person meetings to integrate our ideas for the proposal. Josianne managed the Google Docs and contacted TAs and Dr. Zhao while Selena made plans for the group. During the meetings, Sampda, Gloria, and Yixin offered valuable suggestions for improvement, developing the research idea and incorporating the TAs and professor's feedback. We collectively wrote the proposal, with Sebrina and Josianne providing further editing and Josianne checking for grammar.

For data collection, everyone made a significant effort by using both online and face-to-face methods at UBC. All of us shared the survey link on social media platforms and tried to get as many participants as we could. Sampda collected participants by going to the UBC Nest, and both Sampha and Josianne asked professors to post the survey link in the announcements section. Sebrina and Selena randomly picked UBC students at Orchard Commons and posted the survey's QR code on the bulletin board of the Douglas T. Kenny Building. We completed data collection within 2-3 weeks.

When analyzing the data, Sebrina, Xinyue, and Selena worked together to calculate the results. Sebrina transferred and organized all the relevant data from Qualtrics while all three of them tested the results multiple times using the Chi-Square Calculator.

Josianne, Sampda, and Xinyue practiced and did the presentation for the clients. Josianne created the presentation script aside from the results section which was written by Xinyue; the script was further edited by the entire group. Everyone contributed to the PowerPoint: Sebrina and Selena created all the charts needed for the presentation, and Yixin was responsible for the production and decoration of the very creative PowerPoint.

We divided the final report into sections, with Yixin responsible for the introduction and executive summary, Selena and Sampda working on the participants and measures parts, Sampda forming the conditions and measures part, Selena responsible for the procedures and participants part, Sebrina and Xinyue were responsible for the results, and Josianne was responsible for the discussions and recommendations for the UBC clients parts. Sebrina and Selena also handled the appendix part. Additional demographic charts were created by Josianne to further breakdown the occupations and dietary restrictions of participants. Throughout the process, Yixin found previous research, Sebrina created illustrations and organized the survey questions on Qualtrics, and Josianne helped in checking grammatical mistakes, and refining the final paper and formal expression.

In summary, our group worked together to complete the project.