UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Do you want a drink with that? Exploring the impact of the decoy effect on peoples' food choices

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Abstract

The decoy effect is a cognitive bias, commonly used as a marketing strategy, to influence a buyer's decision. Its purpose is to make the highest priced option appear more attractive by having an asymmetrical dominance over the other two choices. Here we examine how the decoy effect alters people's likelihood of incorporating plant based foods into their diet with and without its presence. By randomly assigning participants into two conditions, we then measured their intended eating behaviour through a survey. We found that approximately three-quarters of our participants chose the meat-based meal when they were presented with the choice of a plant-based or meat-based meal. With the decoy present, we found a decrease in the amount of participants who selected the meat-option. However, the decoy itself was picked for both breakfast and dinner. Through a chi-square significance test, we found that the decoy effect was only statistically significant for breakfast and lunch at $p < .05$, illustrating a relationship between the two options.

Introduction

Including more plant-based foods in peoples' everyday dietary consumption is one of the most effective ways in which an individual can reduce their carbon footprint. However, the awareness of such an impact is not sufficient to convince people to reduce their meat intake—especially if one's cultural norms associate meat consumption with luxury and wealth (Wynes & Nicholas, 2017), as suggested by the finding that the richest 15 nations had a 750% greater per capita demand for meat in 2009 (Tilman & Clark, 2014). A previous study conducted for the University of British Columbia's Social Ecological Economic Development Studies' Sustainability Program (UBC SEEDS), found that participants indicated more willingness to adopt a plant-based diet when presented with messages that emphasize the contents of a plant-based diet (gain frame), as opposed to messages excluding animal products (loss frame). However, the same study found the price of plant-based food items to be one of the major barriers to plant-based food consumption (Conor et al., 2018). Research has long supported that people's preferences regarding decisions involving monetary outcomes, both hypothetical and real, can be reversed by modifying the manner in which questions are framed (Tversky & Kahneman, 1981).

Given this finding, we became interested in studying whether a cognitive bias—called the decoy effect—would prove to be efficient in reversing people's dietary preferences. This effect works on the principle of asymmetrical dominance. i.e., a third option that is slightly inferior to the intended target option, which is introduced in order to make the intended target option appear more valuable. There are many explanations that attempt to clarify why this effect counteracts what would seem like the logical choice. For instance, one of them being that people have to rely on analytic processing to choose the option opposite to the decoy, whereas picking the option similar to the decoy relies on heuristic processing, which is automatic, effortless and requires minimal cognitive control (Hu & Yu, 2014). In our review, we found limited studies testing the decoy effect within the food and drink industry, one of these studies being testing for liquor purchasing decisions. This study found that introducing a decoy option reduced the overall rate at which the least expensive option was chosen without the decoy present. However, the results were context dependent, such that they were magnified when presented within a pub setting (Monk et al., 2016).

Our study attempts to determine whether or not the decoy effect can sway people's intended food choices, independent of physical context, and regardless of their existing dietary and/or monetary preferences; their attitudes about plant-based meals; and their knowledge of climate change.

Research Question

Due to the lack of research regarding the effectiveness of a decoy in modifying people's dietary preferences, our objective for this study is to investigate people's intended eating behaviour and whether a decoy option can nudge people towards selecting plant-based food options. Specifically, if people are more likely to incorporate plant based foods into their diet in response to messages comparing plant-based foods and a decoy versus messages promoting solely plant-based meals.

Given previous findings, we hypothesized that participants will choose the meat-based option less frequently when a decoy plant-based option is present. We also hypothesized that participants will select the plant-based meal with the addition of the drink or side option when they are presented with a decoy, as it is shown to have the highest perceived value. This hypothesis is based on studies that have shown the successful use of the decoy effect in guiding people's choices towards the intended target option and away from the competitor (Monk et al., 2016). Therefore, finding a relationship between people's intended eating behaviour and the presence of a decoy could potentially help guide people towards choosing plant-based meals to eventually reduce their carbon footprint.

Methods

Participants

Since the research guidelines from UBC SEEDS stated a need to increase the consumption of plant-based food on campus, we decided to limit our data collection to current University of British Columbia (UBC) students only, in order to establish relevance. We wanted to target approximately 120 people to prevent the incompletion of the survey or failure to pass the screening question from impacting our sample size. However, due to the COVID-19 pandemic, we had to switch our data collection strategy to solely online, which limited our sample size to the online UBC family. Data was collected from 90 total participants and 25 were removed from the study due to not being UBC students or not completing the survey. They aged from 18-49 with a mean age of 22, including 52 female participants (80% of total participants) and 13 male participants. Since our topic is on plant-based diets, we believed that it was important to know the diet demographic of our participants (See Figure 1, Appendix A).

Conditions

The independent variable of the study is the two different versions of the survey (see Appendix B) automatically randomized by UBC Qualtrics. All of the screening questions were the same. Experimental questions for both surveys were identical, only varying in the answer options of the questions. The baseline version of the survey had two possible options: Meat-based (option A) and Plant-based (option B), as well as three different meal types: Breakfast ($5.00 for option A; $7.00 for option B); Lunch ($12.00 for option A; $14.00 for option B); and Dinner ($22.00 for option A; $24.00 for option B), see Appendix B. The decoy version of the survey had three answer options: a Meat-based (option A), a Plant-based option serving as the decoy (option B), and a plant-based plus a soup/beverage option serving as the intended target option (option C), see Survey 2. This version also included three different meal types: Breakfast ($5.00 for option A; $6.50 for option B; $7.00 for option C); Lunch ($12.00 for option A; $13.50 for option B; $14.00 for option C); and Dinner ($22.00 for option A; $23.50 for option B; $24.00 for option C).

Measures

In accordance with our hypothesis—that being presented with a decoy option will sway our participants' towards our intended target option (option C)—our dependent variable was the participants' intended eating behaviour, which was measured through their responses to the survey questions. We designed our own survey on UBC Qualtrics that consisted of three main questions for each condition, as well as demographic questions that were the same for both conditions. The questions we used offered a clear and concise way to measure our participants' intended eating behaviours and establish a contrast—if one existed—between the baseline and decoy conditions.

Procedure

As a result of the COVID-19 pandemic, in-person data collection was improbable as UBC closed down its campus and switched all classes to an online format. Therefore, the survey format on UBC Qualtrics was changed by adding the consent form to the beginning of the survey (see Appendix C). If participants were unwilling to consent to the study, they would be automatically brought to the "Thank you" section at the end of the survey. Due to the inability to collect data in-person, surveys had to be sent out through the internet. Survey links were posted on UBC Facebook groups (ex. UBC textbook group and UBC Housing), on Twitter (@UBC), on UBC Reddit, and Instagram. Links were also sent to former/ current professors and peers who are currently teaching at or attending UBC. Data collection occurred continuously from March 10, 2020 to April 07, 2020. We monitored data collection every day, in conjunction with brainstorming new ways to recruit more participants. As this is a between-subjects design, we utilized the UBC Qualtrics' randomizer to automatically present different versions of the survey to our participants at roughly equal rates. Since data collection happened online, a decent sample size was one of our main fears. We tried to encourage people to take our survey by asking nicely

(through posts/emails), and also informing potential participants that the survey would only take 5 minutes of their time.

Results

The demographic section of our survey found that about 65% of our sample consumes animal products on all 7 days of the week (see Figure 2, Appendix A); with 2.5 meals per day consisting of some form of animal/dairy products (see Figure 3, Appendix A). On average, our sample also reported preparing 2 meals a day at home (see Figure 4, Appendix A) and spending less than $20 per day on food (see Figure 5, Appendix A). When asked to provide examples of food items consumed, which do not include animal products, our sample predominantly listed vegetables, fruits, and various grains as being their foods of choice (see Table 3, Appendix A).

In the baseline condition, our sample predominantly picked the meat-based option at a rate of about 69% or above, which was also the cheapest option for all three meals. The percentage values of the pick-rate for each option, calculated within Qualtrics, have been provided in Table 1 (Appendix A). In the decoy condition for all three meals, while our sample still predominantly picked the meat-based option, the proportion of them favoring the two plant-based options increased to a rate of approximately 55% and above when compared to the baseline. The percentage values for each option, calculated within Qualtrics, have been provided in Table 2 (Appendix A).

We hypothesized that when the decoy option is present, our sample will favour the plant-based intended target (option C). Our results indicate that this was true only for lunch, thus offering support to our hypothesis. For both breakfast and dinner, however, more people ended up selecting the decoy option itself. Since our primary measure is categorical, we used a Chi-Square significance test to discern whether the changes caused by the decoy option are statistically significant in our sample. The Chi-Square values revealed that our results were statistically significant for breakfast and lunch, but not for dinner. The percentage values used in the computation process were rounded off and taken from the meat-based option (option A) and the intended target plant-based option (option B in the baseline condition; and option C in the decoy condition). The chi-square values were as follows:

Breakfast: The chi-square statistic is 11.3047. The p-value is .000773. The result is significant at $p < .05$.
Lunch: The chi-square statistic is 4.6269. The p-value is .031474. The result is significant at $p < .05$.
Dinner: The chi-square statistic is 1.4746. The p-value is .224616. The result is not significant at $p < .05$.

Discussion

The goal of this study was to examine whether the decoy effect alters people's likelihood of incorporating plant-based meals for breakfast, lunch and dinner. Our results were significant for two of three meals (breakfast and lunch). For the breakfast preferences, even though having the decoy option present brought down the pick-rate for the meat-based option, it did not align with our hypothesis as more participants ended up selecting the decoy option itself. This might have happened due to our participants perceiving the decoy option as the intended target option. Alternatively, it might be related to the comparatively lower price range for breakfast options or a proclivity to pick the middle option. For the lunch preferences, the decoy option successfully increased the pick-rate for our intended target option (option C), which supports our hypothesis that the decoy option will make the intended target option seem more desirable. The price range for the lunch options is higher than the breakfast options, which may have made the perceived value of the intended target option more salient to our participants. The lunch options are also more substantial as meals and the side offered in option C is food based instead of a drink; this might also have strengthened the decoy effect. While the decoy still lowered the pick-rate for the meat-option for dinner, this effect was not statistically significant in our sample. Additionally, akin to breakfast, more people selected the decoy option itself instead of selecting the intended target option. Dinner was our highest price bracket at $22-$24, which might explain why it was our only insignificant result, since our sample indicated that about 70% of them spend less than $20 on food in a day.

Nonetheless, 77% of our sample was composed of people who consume animal products on a daily basis with the indication of having low budgetary allocations; however, they still picked the plant-based options, which were more expensive at a significant rate, for both breakfast and lunch. This seemingly irrational decision making process is well documented in several cognitive domains and has neural underpinnings (Hu & Yu, 2014). This provides the groundwork for further research on the cognitive biases that affect food purchasing decisions in the general population.

Due to the COVID-19 pandemic, our sample size ended up being smaller than what we initially intended for. Additionally, the food and financial insecurity created by the pandemic is a unique contextual and confounding factor and its probable influence on our study cannot be ruled out.

Our baseline condition offered two options to pick from, whereas our decoy condition offered three options to pick from. This difference in the number of choices might have increased the cognitive effort required to select one option, and may have consequently influenced our results by diluting participants' preference for the meat-based option.

Recommendations

For future recommendations, we encourage studies to investigate specific meals since there were three different statistical results for three different meals. This would provide a more thorough understanding of what happens when we target each meal when taking wider price brackets into consideration. It is also worth testing whether the decoy effect is strong enough to trump food preferences in a larger sample by using different versions of the decoy such as portion sizes and cost, as well as testing whether the number of choices alone plays a factor in creating the difference rather than the perceived value of the options themselves. Furthermore, studies can be done to investigate the range of price brackets in order to take into account an average students' affordability of a type of meal/food. Further investigations can prompt collaborations with UBC's Alma Mater Society's (AMS) cafés to create neutral messaging and menu layout options incorporating the decoy effect, in order to increase plant-based consumption without alienating meat eaters. Additionally, it can serve as an incentive for cafés to offer more plant-based meal options since our results indicated that, when presented alongside a decoy, our participants did select the more expensive food options more often (which were plant-based).

References

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Appendix A

Table 1

Data from Baseline condition

MEAL TYPE	MEAT-BASED (Option A)	PLANT-BASED (Option B)
Breakfast	68.75% (22 respondents)	31.25% (10 respondents)
Lunch	81.25% (26 respondents)	18.75% (6 respondents)
Dinner	84.38% (27 respondents)	15.63% (5 respondents)

Table 2

Data from Decoy condition

MEAL TYPE	MEAT-BASED (Option A)	PLANT-BASED Decoy (Option B)	PLANT-BASED Intended Target (Option C)
Breakfast	60.61% (20 respondents)	33.33% (11 respondents)	6.06% (2 respondents)
Lunch	54.55% (18 respondents)	18.18% (6 respondents)	27.27% (9 respondents)
Dinner	57.58% (19 respondents)	36.36% (12 respondents)	6.06% (2 respondents)

Table 3

Examples of plant-based meals provided by our sample, when asked to report any meals in which they do not consume animal products. Exact repetitions removed. Those who answered with "Not applicable" removed.

toast/bread, fruit (and nut butter), vegetables and hummus, tea/coffee
Avocado toast
Something bread-based, or soup.
I don't really eat breakfast, but I'll usually have a banana and a granola bar.
Frozen fruit and vegetables, fresh fruit
instant noodles or just fruits
fruits, vegetables, rice, pasta, bread
Beans, grains
Veggies, fruit, grains, tofu
Maybe sporadic meals here and there, but almost every meal has some sort of meat and/or dairy in it.
Cereal with soy milk
Vegetables Tofu (Veggie alternatives to meats)

Usually bread/bread-based product as a light lunch
Salads without meat potentially
Brown rice, may be with lentils, green leaf curry etc
Beans, Lentils, Vegetables, Fruit, Tofu, Whole Grains
Vegetables and fruits, I barely eat meat. I usually eat meat 1x every 2 weeks or so, and I don't eat butter, eggs, and milk.
Lots of veggies (usually this meal just doesn't have protein)
Fruit smoothies (without milk)
Vegetables, lentils, tofu
Beans for the meat Oat milk for the dairy Chickpeas for the eggs Nothing too processed or soy-based
Tofu, oatmeal, salad
Overnight oats for breakfast with almond milk
Usually for breakfast I eat cereal or bread.
Vegetables (cauliflower, potatoes, broccoli, carrots, etc.) Salad (with tomatoes, cucumbers, balsamic vinegar)

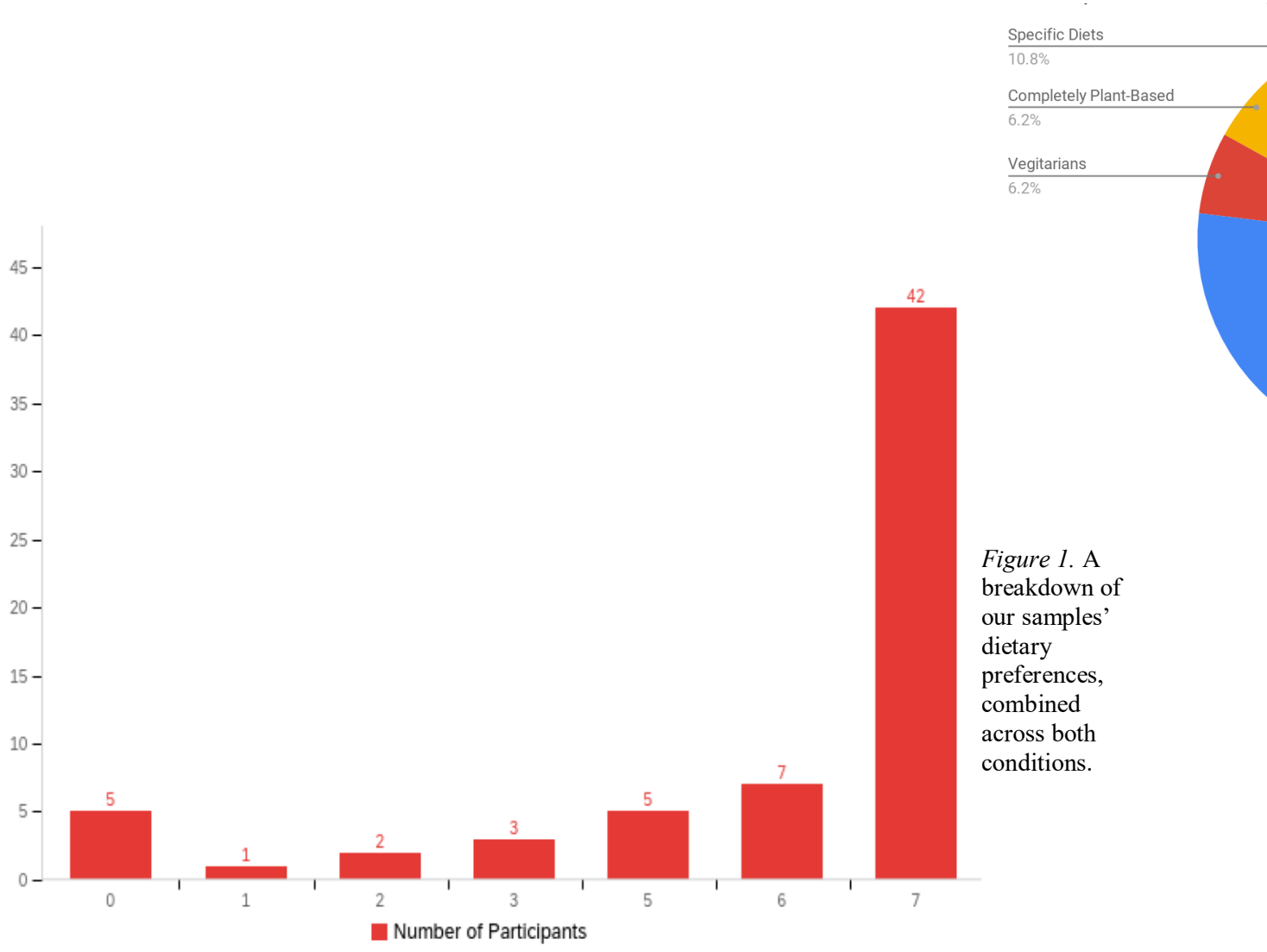

Figure 1. A breakdown of our samples' dietary preferences, combined across both conditions.

Figure 2. Self-reported consumption of animal products, such as meat, fish, eggs, and dairy, in one typical week. Number of days on y-axis.

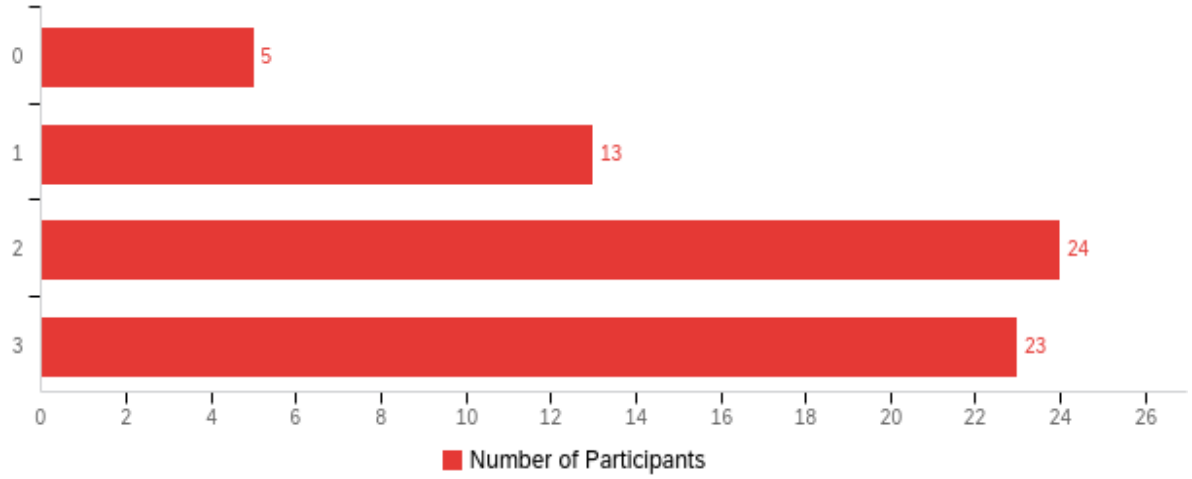

Figure 3. Number of meals in which animal products, such as meat, fish, eggs, and dairy, are consumed in one typical day (x-axis).

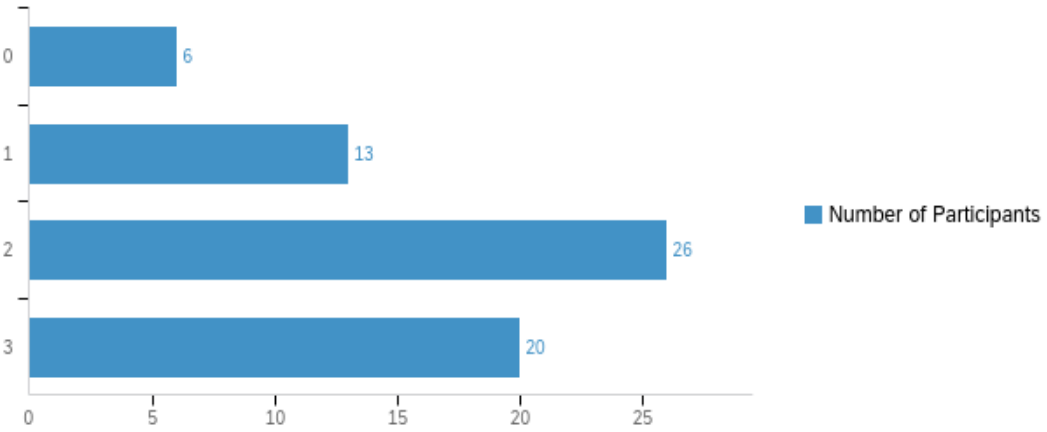

Figure 4. Number of meals cooked at home in one typical day (x-axis).

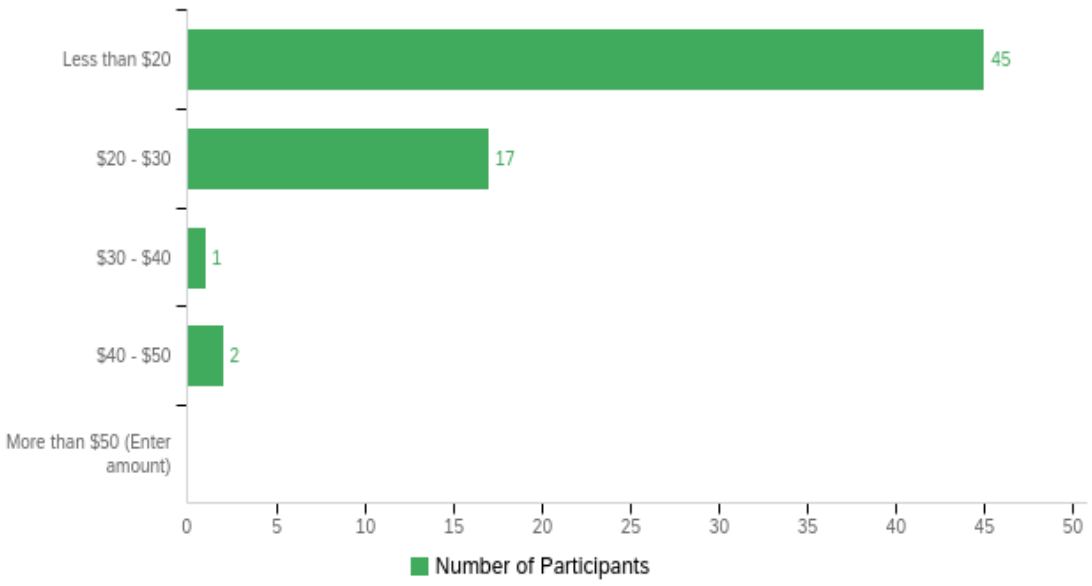

Figure 5. Amount of money self-reported as being spent on food per day.

Appendix B

Survey

Baseline Condition

Out of the following meal options, which one would you purchase?

1. Breakfast
    1. Bacon, Sausage, Egg Breakfast Sandwich ($ 5.00)
    2. Beyond Meat Breakfast Sandwich ($ 7.00)
2. Lunch
    1. Spaghetti and Meatballs ($12.00)
    2. Spaghetti and Cauliflower Meatballs ($14.00)
3. Dinner
    1. Thai Curry, Chicken or Beef, with rice ($22.00)
    2. Thai Curry, Vegetables and Tofu, with rice ($24.00)

Test Condition

Out of the following meal options, which one would you purchase?

1. Breakfast
    1. Bacon, Sausage, Egg Breakfast Sandwich ($ 5.00)
    2. Beyond Meat Breakfast Sandwich ($ 6.50)
    3. Beyond Meat Breakfast Sandwich, with medium sized drink ($ 7.00)
2. Lunch
    1. Spaghetti and Meatballs ($12.00)
    2. Spaghetti and Cauliflower Meatballs ($13.50)
    3. Spaghetti and Cauliflower Meatballs, with a side of salad or fries ($14.00)
3. Dinner
    1. Thai Curry, Chicken or Beef, with rice ($22.00)
    2. Thai Curry, Vegetables and Tofu, with rice ($23.50)
    3. Thai Curry, Vegetables and Tofu, with rice, and a small soup ($24.00)

Background Questions – Constant Across Conditions

1. Are you currently a UBC Student?
2. How old are you? _____
3. Which gender do you identify with:
    1. Female
    2. Male
    3. Other: _____
    4. Prefer not to say
4. What kind of diet are you currently on?
        1. Vegetarian (No Meat)
        2. Completely plant-based (No Meat or Dairy Products)
        3. Omnivorous (includes meat and dairy products, includes plant based products)
        4. A specific diet _____ (please briefly describe it)
5. In a typical week, on how many days do you consume animal products such as meat, fish, dairy, or eggs? Enter a number from 0 – 7 _____
6. Out of your 3 main meals on a typical day (breakfast, lunch, and dinner), how many meals include animal products such as meat, fish, dairy, or eggs?
        1. 0
        2. 1
        3. 2
        4. 3
7. If there are meals in which you do not consume animal products such as meat, fish, dairy, or eggs, what do you consume? (Please write NA if this does not apply to you) _____
8. In one typical day, how many of your main meals (breakfast, lunch, dinner) do you prepare yourself at home?

1. 0
2. 1
3. 2
4. 3

9. On average, how much money do you spend on food every day?
1. Less than $20
2. $20 - $30
3. $30 - $40
4. $40 - $50
5. More than $50

Appendix C

Consent Form

Class Research Projects in PSYC 421 - Environmental Psychology

Principal Investigator: Dr. Jiaying Zhao, Course Instructor, Department of Psychology, Institute for Resources, Environment and Sustainability
Email: jiayingz@psych.ubc.ca

Introduction and Purpose

Students in the PSYC 421 – Environment Psychology class are required to complete a research project on the UBC campus as part of their course credit. In this class, students are required to write up a research proposal, conduct a research project, analyze data, present their findings in class, and submit a final report. Their projects can include surveys, observations, and simple experiments on waste sorting on campus, student health and well being, food consumption and diet, biodiversity perception, and exercise habits. The goal of the project is to train students to learn research techniques, how to work in teams and work with UBC clients selected by the UBC SEEDS (Social Ecological Economic Development Studies) program.

Study Procedures

If you agree to participate, the study will take about 10 to 15 minutes of your time. You will answer a few questions in the study. The data will be strictly anonymous. Your participation is entirely voluntary, and you can withdraw at any point without any penalty. Your data in the study will be recorded (e.g., any answer you give) for data analysis purposes. If you are not sure about any instructions, please do not hesitate to ask. Your data will only be used for student projects in the class. There are no risks associated with participating in this experiment.

Confidentiality

Your identity will be kept strictly confidential. All documents will be identified only by code number and kept in a locked filing cabinet. You will not be identified by name in any reports of the completed study. Data that will be kept on a computer hard disk will also be identified only by code number and will be password protected so that only the principal investigator and course instructor, Dr. Jiaying Zhao and the teaching assistant will have access to it. Following the completion of the study, the data will be transferred to a password protected hard drive and stored in a locked filing cabinet. Please note that the results of this study will be used to write a report which is published on the SEEDS library.

Remuneration

There is no remuneration for your participation.

Contact for information about the study

This study is being conducted by Dr. Jiaying Zhao, the principal investigator. Please contact her if you have any questions about this study. Dr. Zhao may be reached at (604) 827-2203 or jiayingz@psych.ubc.ca.

Contact for concerns about the rights of research subjects

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Consent

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your class standing. You may also withdraw from the experiment at any time during or after your participation and request that your data be deleted.

Please feel free to ask the experimenter any additional questions you may have about the study. Your response below indicates that you consent to participate in this study.

- No, I do not consent to participating in this study.
- Yes, I consent to participating in this study.