Labeling and framing effects in the willingness to purchase upcycled food

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Labeling and framing effects in the willingness to purchase upcycled food

18 Grams

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Executive Summary

This study explored how labeling and framing affect people's willingness to pay (WTP) for upcycled food, hypothesizing that labeling upcycled food as recoverable food as opposed to food scraps will increase WTP, and that framing the economic benefits as opposed to the societal benefits of upcycled food will reduce WTP differences between these labels. Participants recruited from the UBC community (N=128) were randomly assigned to read 1 of 4 versions of an article about upcycled food products that varied in terminology (describing ingredients as 'food scraps' or 'recoverable food') and framing (emphasizing economic or societal benefits). Participants then rated their willingness to accept purchasing and consuming 5 UBC food product images presented as being upcycled, along with their WTP for each. Results found that the 'food scraps' label did not create significantly more negative product perceptions nor significantly reduce related WTP compared to the 'recoverable food' label. A similar lack of significant positive findings was found for framing emphasizing economic benefits on all these measures compared to societal benefits, alongside no significant effect interaction between labeling and framing. This suggests that labeling and framing are not important factors in encouraging people to purchase and consume upcycled food products.

Introduction

The process of food going 'farm-to-table' has always been fraught with wasted materials even following successful production. Not from ingredients becoming unsafe for human consumption, but rather from ingredients being discarded as 'off-spec' products or left unharvested due to inadequacies in storage, amongst other reasons (Environment and Climate Change Canada, 2019). Data estimates in recent years suggest that Canada alone disposes of 11 million tonnes of domestically produced food annually due to such issues (VCMI, 2019, as cited in Environment and Climate Change Canada, 2019); as a result, the question of how we can redirect avoidable food waste has become significant as a problem for our society to address. One solution that has recently grown in traction is the idea of 'upcycled' food, nutritious consumable substances that are made using ingredients that would "otherwise have ended up in a food waste destination" where they would be landfilled or incinerated (Upcycled Food Association and Foundation). Examples include soups using vegetable castoffs, beers using surplus wheat as malt, etc.

Yet the widespread adoption of food upcycling has been limited by consumer bias against accepting this practice in edible products, as evidenced by their utility preferences. Bhatt et al. (2020) found that the mean willingness to pay (WTP) for several food products was lower if they were described as upcycled ($4.46 USD) instead of conventional ($4.95 USD), despite being equivalent on all other aspects. This may have sustained traditional approaches to food production and disposal in the interests of maximizing consumer appeal and thus sales. But research has since determined factors that can be manipulated to positively influence perceptions and preferences towards upcycled food products. Stressing how food upcycling presents a frugal use of resources in framing information about its benefits has proved effective in creating favorable consumer attitudes towards upcycled food, relative to framing information highlighting its benefits in creating products of high quality, nutrition, and taste (Aschemann-Witzel et al., 2022). However, the existing literature lacks studies on how presentational factors outside of framing may affect acceptance and preferences towards upcycled food products, and whether such factors may interact with each other in shaping consumer utility preferences.

Research question and hypothesis

Following the knowledge deficit we identified in the background literature, we decided to assess how consumer preferences surrounding upcycled food products (as expressed in WTP) might be affected by the choice of language labels used within presentations of the topic, and how they might interact with the effects found in previous research of framing information on consumer perceptions and preferences surrounding upcycled food products.

Our research question is: How do labeling and framing influence people's willingness to pay for upcycled food? We hypothesize that (H1) Labeling upcycled food as recoverable food as opposed to food scraps will increase the willingness to pay, and that (H2) framing the economic benefits as opposed to the societal benefits of upcycled food will reduce differences in willingness to pay between these labels.

Methods
Participants

A power analysis (assuming a minimum effect size=0.25, alpha=0.05, power=0.8) determined that we needed a minimum of 128 participants in our study. Fortunately, we were successful in satisfying this requirement with exactly 128 participants from the UBC community, excluding those that did not fully complete the survey (n=91). ~57.8% (n=74) of participants

identified as female and ~28.1% (n=36) identified as male. The remaining 14.1% consisted of non-binary (n=4), other (n=2), and n=12 participants who preferred not to answer questions about their gender (Appendix B, Figure 1). A 69.1% majority of these participants came from the 20-25 age range, alongside 16.3% aged 10-19, 5.7% aged 26-30, and 6.2% preferring not to answer questions about their age (Appendix B, Figure 2). Our sample comprised not just students but also faculty members and service staff at UBC. Each community position was additionally categorized as being either residents or commuters, given that home location may affect the degree to which participants are liable to engage with upcycled food products on campus. Resident undergraduates represented the vast majority of participants, followed by commuting undergraduates (Appendix B, Figure 3).

Conditions

Two independent variables were manipulated in this study in language labels and framing information. Participants were randomly assigned to read only 1 of 4 different versions of an article defining and discussing upcycled food products. Said articles varied on 2 dimensions: The terminology it uses to refer to upcycled ingredients (referring to it as "recoverable food" or "food scraps") and the framing of benefits with upcycling food (emphasizing its economic benefits or societal benefits). This established a total of 4 between-subject conditions in this study in a 2x2 factorial experimental design: Recoverable Food x Economic Benefits, Food Scraps x Economic Benefits, Recoverable Food x Social Benefits, and Food Scraps x Societal Benefits. Each of the paragraph articles shown for each condition are available in Appendix A, Question 2-5, which were kept equivalent in terms of general length and wording outside of statements which directly pertained to language labels or framing the benefits of upcycling food.

Measures

The dependent variable of our study was the utility preferences of participants towards upcycled food products, operationalized as their willingness to purchase 1 unit/serving of them. Participants were presented with an image of a food dish, which we identified to them as being made from upcycled ingredients, and asked to self-report their level of agreement with statements about purchasing and consuming said dish on a 5-point Likert scale. We measured both Likert rating scores towards purchasing and consuming a given food dish for one occasion and as part of participants' typical diet, as to distinguish for any differences between short-term and long-term utility preferences following our manipulation of the IV. Participants were also asked to self-report measures of their WTP for the upcycled food products shown in Canadian dollars (CAD). Answers were limited to a given range stated in the question to implicitly convey to participants how the food dish shown was generally priced (outside of if it was conventionally produced or upcycled) and to prevent outlier responses to this measure derived from a lack of information rather than actual WTP preferences. This range was based on real prices for the food dishes shown at the UBC campus, from a minimum of $0 to its real price*1.25, rounded up to the nearest integer. 5 different dishes were presented in our measures to avoid the influence of individual preferences on food choice: a Seeded Carrot Muffin, Black Forest Cake, a Tomato & Mushroom Flatbread, Nasi Goreng, and a Classic Caesar Salad. All those dishes were available in the real menus of restaurants on UBC campus.

Procedure

Online surveys were conducted to collect data using UBC Qualtrics. Our survey starts with a consent form, as provided by Dr. Zhao. If participants did not consent to participate in the study, the survey was terminated immediately. They were otherwise directed to a screen presenting 1 of 4 randomly assigned paragraph articles introducing upcycled food, as described in the Conditions section of this paper. The survey only gave participants the option to continue 10s after the requisite article page loaded so as to create a window of time where they would read the article instead of skipping through. Participants were then asked to respond to questions rating their level of agreement with the statements "I would be willing to purchase an upcycled (dish name) to consume once." and "I would be willing to purchase an upcycled (dish name) to consume on my usual basis.". They were simultaneously asked to state their WTP for the product image shown on the page. As 3 questions were asked of each of the 5 dishes shown, 15 total questions were used to collect our key measures. The sequence in which dishes were shown was randomized across survey participants to prevent order effects, and participants were not able to skip during this section. Demographic information on gender, age, and UBC community position was collected afterwards from 3 voluntary questions at the end of our survey.

Survey distribution was accomplished using two methods. We posted a hyperlink to our survey on social media, including but not limited to online friend circles linked to the UBC community, and walked around the UBC campus to recruit participants in-person via a shared QR code. As such this study took an opportunity sample of participants from the population identified in our survey as UBC community members, excluding those who report otherwise. A major problem encountered throughout data collection was how some participants left missing answers to the 15 preference questions despite having answered some of them by the time our survey window closed, requiring additional work to sort and exclude invalid data from our statistical analysis.

Results

The data consistently showed that mean Likert rating scores across all 5 food dishes were higher for agreement with statements about purchasing and consuming a given upcycled food dish once, compared to purchasing and consuming it on a usual basis. This pattern held across all 4 conditions. However, both mean Likert rating scores were observed as being slightly higher for participants in the Food Scraps x Societal Benefits condition and slightly lower for participants in the Recoverable Food x Economic Benefits condition relative to all others. Both mean Likert rating scores for the other conditions yielded values between these two that were roughly similar (Appendix C, Figure 1). Some similar patterns emerged with the WTP participants reported for each upcycled food dish with the consistently highest mean $CAD values given under the Food Scraps x Societal Benefits condition and the consistently lowest mean $CAD values under the Recoverable Food x Economic Benefits condition. However, unlike mean Likert rating scores no consistent patterns were found with mean WTP for each upcycled food dish across the other two conditions. Descriptive statistics are available in Appendix C, Figure 3.

A two-way MANOVA was conducted in JASP to determine whether each of these differences with labeling and framing had practical and statistical significance. However, software limitations barred us from calculating main and interaction effect sizes directly and instead necessitated that we run separate ANOVAS for each of our measures to conduct our intended form of statistical analysis. The results are shown in Appendix C, Figure 4, which find trivial and non-significant effect sizes ($\eta^2 < .01$, $p > .05$) of labeling and framing both

individually and in interaction for the majority of our measures. The sole exception to this was a small but still non-significant main effect for labeling ($\eta^2 = .012$, $p = .219$) and framing ($\eta^2 = .013$, $p = .198$) on mean Likert scale ratings towards statements about purchasing and consuming a given upcycled food dish once. A MANOVA Pillai Test was also used to holistically determine statistical significance in our data analysis, given its more robust results in the case of homogeneous and heterogeneous variances for 2 variables. Appendix C, Figure 5 shows the results of our Pillai test and indicates statistical non-significance for all our independent variables, given Pilai traces very close to 0 and p-values > .05 for a main labeling effect (Pilai trace = .046, $p = .581$), a main framing effect (Pilai trace = .027, $p = .858$), and interaction (Pilai trace = .052, $p = .486$). Since these results were not statistically significant, both hypotheses of this study were not supported by our data.

Discussion

In our study, we found that labeling and framing upcycled food products had little effect on participants' willingness to purchase them. This finding has theoretical implications for understanding how consumers perceive and value upcycled food products. Our results suggest that using positive vocabulary or framing the benefits of upcycling food in specific ways is unlikely to be effective in changing consumer behavior.

The limitations still exist in the study. From the participants' perspective, participants might need more patients to read the whole article, and there is a reliable method to ensure that participants finish the article. Another challenge from the participant's perspective is that individual perception of words differs. Lacking methods to ensure every participant has the same perception of words is another major limitation of the experiment. Therefore, the validity of the experiment is questionable. In addition, the experiment's sample selection is biased, focusing on UBC students and constructing characteristics unique to the UBC community population, given Wealthy, educated, environmentally and socially conscious relative to the general population.

One way to address these limitations is to include a more diverse sample of participants from different backgrounds and ages. Researchers could also consider using objective measures, such as eye-tracking, to ensure that participants are fully engaged with the marketing materials. Additionally, using standardized language and clear definitions of terms could help reduce variability in participant perceptions.

Recommendations for our UBC client

This experiment recruited our students or staff on the ubc campus to complete a questionnaire about upgrading food. The questionnaires were about the acceptance and range of willingness to pay for upcycled food on the ubc campus. Our study identified several potential alternative explanations for our findings, including lack of motivation to read articles, differences in perception between evaluating upcycled food from images versus in-person, selection bias in our sample collection method, and unique characteristics of the UBC community population. Although the results of this experiment do not support our hypothesis. However, based on this study, we offer several recommendations to our clients on how to promote upcycled foods more effectively. For the future development of upcycled food within the ubc campus, future research on upcycled food perceptions should consider conducting studies with broader populations or exploring people's attitudes and behaviors toward upcycled food in other more interactive ways. This could involve engaging consumers in tasting events or providing them with hands-on experiences with upcycled food products.

Moreover, our findings may help UBC Food Services develop more effective strategies for

promoting sustainable food practices. For example, they may consider implementing educational programs to increase awareness of upcycled food and its potential benefits, and the benefits of upcycling food for the environment and reducing waste could also be promoted. Additionally, UBC Food Services could explore partnerships with local organizations that specialize in upcycling food to create more upcycled food options on campus. Furthermore, our study contributes to the existing literature on sustainable food practices and consumer behavior. Specifically, our use of a 2x2 factorial experimental design and operational definition of positive/negative perceptions towards upcycled food provide some of our first insights into how factors may influence each other in shaping consumer acceptance of upcycled food. Future studies could build upon our findings by examining the effectiveness of different marketing strategies, exploring the impact of social norms on consumer behavior towards upcycled food, and investigating the potential long-term benefits of upcycled food on the environment and health. Overall, these findings have important implications for both theoretical and practical aspects of understanding and promoting upcycled food products.

References

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Appendix A
Survey Questions

Question 1 - Consent

Hello and thank you for taking your time today to volunteer for this psychology research project. Before we begin, please review the consent form below, which outlines how long this study will generally take, expected remuneration for your participation, the rights you hold as a participant, and who to contact for information about this study or concerns about the rights of research subjects.

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, collect and analyze data, present their findings in class, and submit a final report. Their final reports will be published on the SEEDS online library (https://sustain.ubc.ca/teaching-applied-learning/seeds-sustainability-program). Their projects include online surveys and experiments on a variety of sustainability topics, such as waste sorting on campus, student health and wellbeing, food consumption and diet, transportation, 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 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 encrypted and password protected so that only the principal investigator and course instructor, Dr. Jiaying Zhao and the teaching assistants will have access to it. Following the completion of the study, the data will be transferred to an encrypted and 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. You also may postpone your decision to participate for 24 hours. You have the right to choose to not answer some or any of the questions. By clicking the "continue" button, you are indicating your consent to participate; hence, your signature is not required. The researchers encourage you to keep this information sheet for your records. Please feel free to ask the investigators any additional questions that you have about the study.

Ethics ID: H17-02929

○ I consent to participate in this study and will continue to the experiment.

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Question 2 - Recoverable Food x Economic Framing condition

Upcycled food products refer to edible culinary goods that are made with ingredients derived from recoverable food that might otherwise be disposed of as waste. Ingredients derived from recoverable food include processed byproducts and surplus inventory selected from previous food production. Globally, we lose around $1 trillion per year on food that is recoverable. Upcycled food production captures that value and leverages it to create a sustainable and resilient food system. It presents an innovative approach to handling recoverable food because it is the first consumer product-based solution, making it highly scalable and economically sustainable.

→

Question 3 - Recoverable Food x Societal Framing condition

Upcycled food products refer to edible culinary goods that are made with ingredients derived from recoverable food that might otherwise be disposed of as waste. Ingredients derived from recoverable food include processed byproducts and surplus inventory selected from previous food production. Globally, many organizations and experts recognize and support efforts to create new culinary products using recoverable food. Upcycled food production offers an effective solution to handling social problems with landfill buildup and food security. It presents a popular approach to handling recoverable food because it is a adaptable choice for customers who are seeking prosocial food choices across various taste preferences.

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Question 4 - Food Scraps x Economic Framing condition

Upcycled food products refer to edible culinary goods that are made with ingredients derived from food scraps that might otherwise be disposed of as waste. Ingredients derived from food scraps include processed byproducts and surplus inventory selected from previous food production. Globally, we lose around $1 trillion per year on food that is scrapped. Upcycled food production captures that value and leverages it to create a sustainable and resilient food system. It presents an innovative approach to handling food scraps because it is the first consumer product-based solution, making it highly scalable and economically sustainable.

→

Question 5 - Food Scraps x Societal Framing condition

Upcycled food products refer to edible culinary goods that are made with ingredients derived from food scraps that might otherwise be disposed of as waste. Ingredients derived from food scraps include processed byproducts and surplus inventory selected from previous food production. Globally, many organizations and experts recognize and support efforts to create new culinary products using food scraps. Upcycled food production offers an effective solution to handling social problems with landfill buildup and food security. It presents a popular approach to handling food scraps because it is an adaptable choice for customers who are seeking prosocial food choices regardless of taste preferences.

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Questions 6-20 - Measures

Depicted below is a Seeded Carrot Muffin that has been produced using quality certified upcycled food ingredients, typically sold at the dining hall Feast in the Totem Park residence on UBC campus.

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Seeded Carrot Muffin to consume once."

○ Strongly disagree
○ Somewhat disagree
○ Neither agree nor disagree
○ Somewhat agree
○ Strongly agree

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Seeded Carrot Muffin to consume on my usual basis."

○ Strongly disagree

○ Somewhat disagree

○ Neither agree nor disagree

○ Somewhat agree

○ Strongly agree

How many Canadian Dollars would you be willing to pay to purchase a Seeded Carrot Muffin that has been made using upcycled ingredients? Please give an answer in the range of $0 - $5.

[   ]

→

Depicted below is a Black Forest Cake that has been produced using quality certified upcycled food ingredients, typically sold at Hero Coffee + Market on UBC campus.

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Black Forest Cake to consume once."

○ Strongly disagree

○ Somewhat disagree

○ Neither agree nor disagree

○ Somewhat agree

○ Strongly agree

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Black Forest Cake to consume on my usual basis."

○ Strongly disagree
○ Somewhat disagree
○ Neither agree nor disagree
○ Somewhat agree
○ Strongly agree

How many Canadian Dollars would you be willing to pay to purchase a Black Forest Cake that has been made using upcycled ingredients? Please give an answer in the range of $0 - $8.

[   ]

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Depicted below is a bowl of Nasi Goreng that has been produced using quality certified upcycled food ingredients, typically sold at The Point restaurant on UBC campus.

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Nasi Goreng to consume once."

○ Strongly disagree
○ Somewhat disagree
○ Neither agree nor disagree
○ Somewhat agree
○ Strongly agree

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Nasi Goreng to consume on my usual basis."

○ Strongly disagree

○ Somewhat disagree

○ Neither agree nor disagree

○ Somewhat agree

○ Strongly agree

How many Canadian Dollars would you be willing to pay to purchase a bowl of Nasi Goreng that has been made using upcycled ingredients? Please give an answer in the range of $0 - $20.

[   ]

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Depicted below is a Tomato & Mushroom Flatbread that has been produced using quality certified upcycled food ingredients, typically sold at the Perugia Italian Caffè on UBC campus.

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Tomato & Mushroom Flatbread to consume once."

○ Strongly disagree

○ Somewhat disagree

○ Neither agree nor disagree

○ Somewhat agree

○ Strongly agree

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Tomato & Mushroom Flatbread to consume on my usual basis."

○ Strongly disagree

○ Somewhat disagree

○ Neither agree nor disagree

○ Somewhat agree

○ Strongly agree

How many Canadian Dollars would you be willing to pay to purchase a Tomato & Mushroom Flatbread that has been made using upcycled ingredients?
Please give an answer in the range of $0 - $14.

[   ]

→

Depicted below is a bowl of Classic Caesar Salad that has been produced using quality certified upcycled food ingredients, typically sold at the Perugia Italian Caffè on UBC campus.

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Classic Caesar Salad to consume once."

○ Strongly disagree
○ Somewhat disagree
○ Neither agree nor disagree
○ Somewhat agree
○ Strongly agree

Rate your level of agreement with the statement: "I would be willing to purchase an upcycled Classic Caesar Salad to consume on my usual basis."

○ Strongly disagree
○ Somewhat disagree
○ Neither agree nor disagree
○ Somewhat agree
○ Strongly agree

How many Canadian Dollars would you be willing to pay to purchase a Classic Caesar Salad that has been made using upcycled ingredients? Please give an answer in the range of $0 - $12.

[   ]

→

Questions 21-23 - Participant demographics

Please describe your age (in years) using the text box below.

[   ]

Which of the following best describes your gender identity?

○ Male
○ Female
○ Non-binary
○ Other
○ Prefer not to answer

Which of the following best describes your position within the UBC community?

○ Undergraduate student resident
○ Graduate student resident
○ Undergraduate commuting student
○ Graduate commuting student
○ Resident academic faculty
○ University service staff & resident
○ Non-university service staff & resident
○ Commuting academic faculty
○ Commuting university service staff
○ Commuting non-university service staff
○ Other
○ Prefer not to answer

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Debriefing statement

Debriefing Statement
PSYC 421 Research Project: Diction's effects on upcycled food perceptions and interactions with framing

Thank you for your participation in this experiment. The goal of this study was to determine how the choice of label used to refer to upcycled ingredients in descriptions of the topic of food upcycling affect positive/negative perceptions of its products in the UBC community, and whether the strength of any labeling effects vary with how the topic of upcycled food products is framed. This survey randomly assigned you read 1 of 4 articles discussing the topic of food products made using 'upcycled' ingredients that would have otherwise have ended up in a food waste destination. These articles varied on 2 different ways: Whether upcycled food ingredients were referred to as being derived from "recoverable food' or "food scraps", and whether the statement's framing highlighted the economic benefits or the societal benefits of food upcycling.

We were interested in how the language labels describing upcycled food ingredients would affect how its products are perceived, as well as whether any effects from labelling might interact with the perceptual effects of how food upcycling was framed. This was measured through your stated willingness to accept personal purchases and consumption of several UBC food products which we labelled as upcycled, and how much you stated you were willing to pay each of them.

It is expected that participants would be willing to pay more and exhibit a greater willingness to accept purchasing and consuming these food products on average if the article's framing emphasized the economic benefits of food upcycling, compared to emphasizing its societal benefits. Participants are also predicted to be willing to pay less and show a lower willingness to accept purchasing and consuming the food products shown on average if upcycled food ingredients were referred to in the article as being derived from "food scraps" compared to "recoverable food". Differences in these measures with the choice of label used are anticipated to fall provided economic benefit framing due to changing participant cognition towards such products.

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End of survey

We thank you for your time spent taking this survey.
Your response has been recorded.
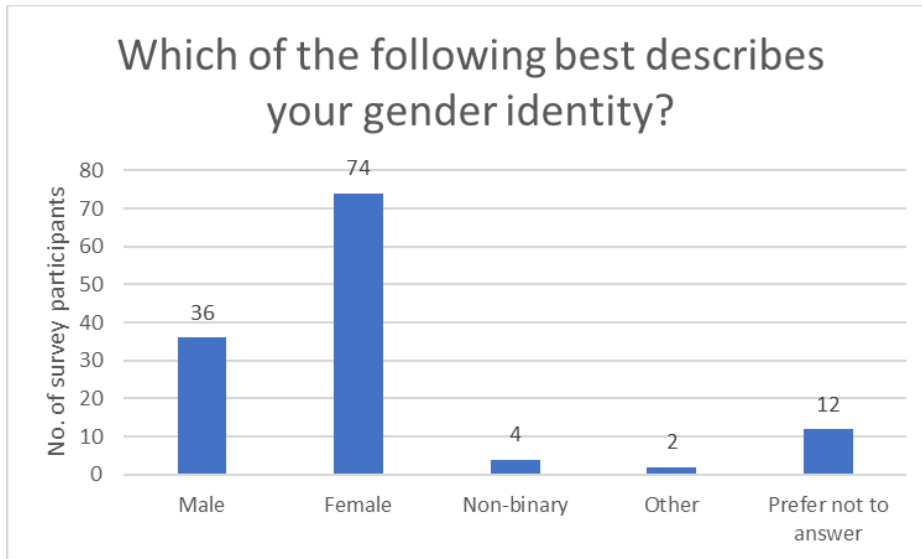
Appendix B
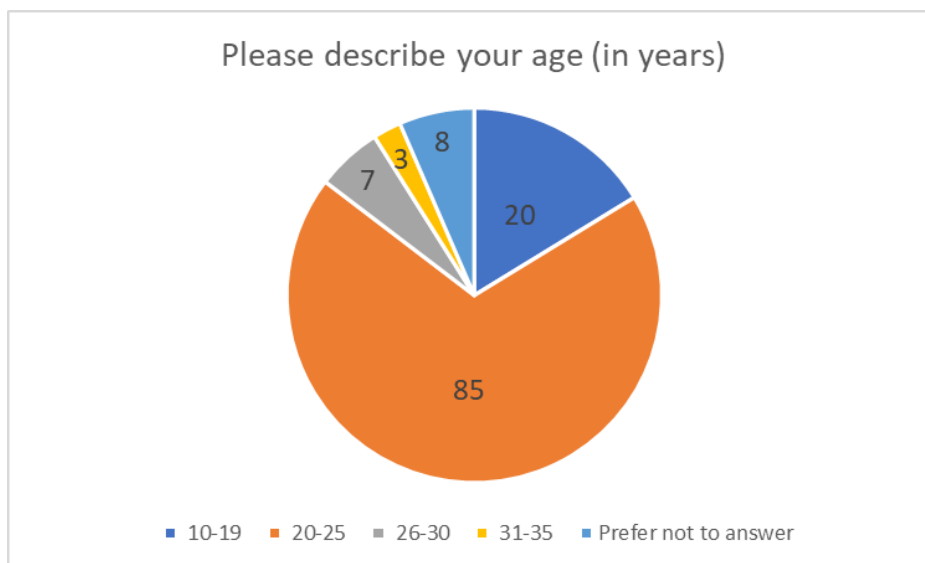Participant Demographics

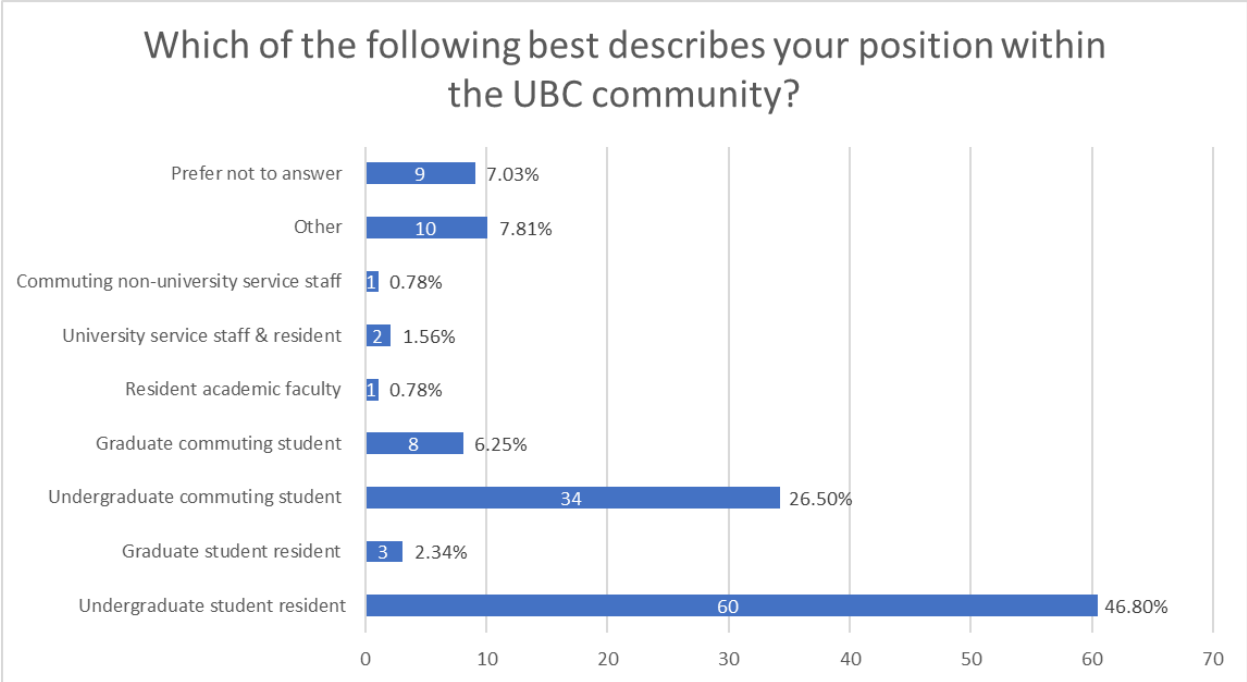Figure 1. Participant gender

Figure 2. Participant age

Figure 3. Participant position in the UBC community

Appendix C
Results of Survey

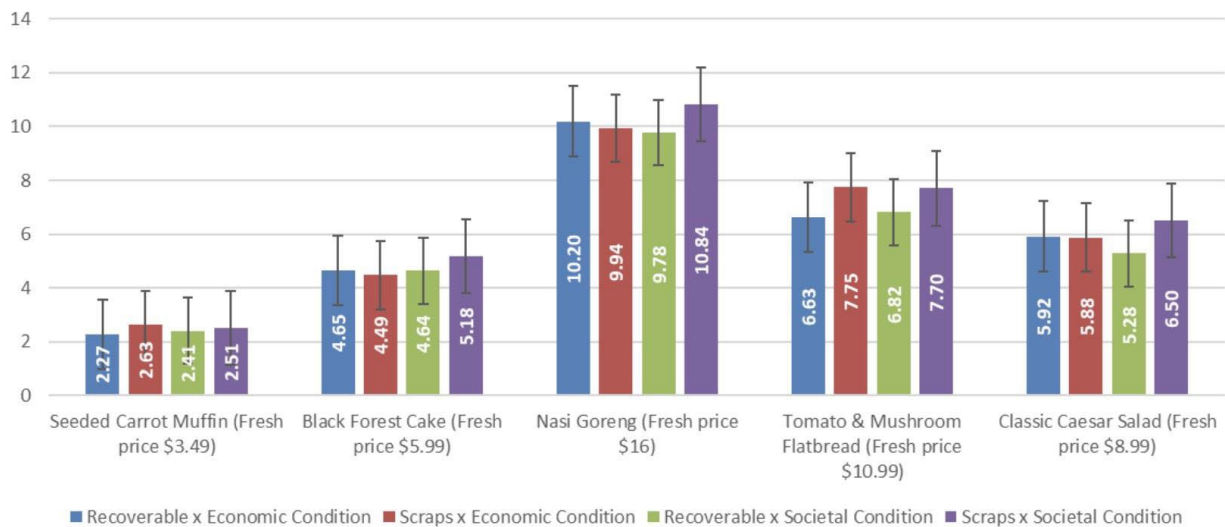Figure 1. Graphical results, average Likert scale responses

Figure 2. Graphical results, mean participant WTP for upcycled food items

Descriptive Statistics

| | Likert scale averages: Consuming once | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	3.619	3.724	3.340	3.628
Std. Deviation	0.875	0.938	0.779	0.798
Minimum	1.600	1.200	1.000	2.400
Maximum	5.000	5.000	4.800	5.000

Descriptive Statistics

| | Likert scale averages: Usual consumption | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	3.000	3.108	2.900	3.021
Std. Deviation	1.002	1.104	0.733	0.712
Minimum	1.400	1.000	1.000	1.800
Maximum	5.000	5.000	4.600	4.600

Descriptive Statistics ▼

| | How many Canadian Dollars would you be willing to pay to purchase a Seeded Carrot Muffin that has been made using upcycled ingredients? Please give an answer in the range of $0 - $5. | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	2.633	2.507	2.267	2.414
Std. Deviation	1.139	1.465	1.271	1.296
Minimum	0.000	0.000	0.000	0.000
Maximum	5.000	5.000	4.000	5.000

Descriptive Statistics

| | How many Canadian Dollars would you be willing to pay to purchase a Black Forest Cake that has been made using upcycled ingredients? Please give an answer in the range of $0 - $8. | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	4.487	5.176	4.650	4.638
Std. Deviation	1.962	2.310	2.154	2.100
Minimum	0.000	0.000	0.000	0.000
Maximum	8.000	8.000	8.000	8.000

Descriptive Statistics

| | How many Canadian Dollars would you be willing to pay to purchase a bowl of Nasi Goreng that has been made using upcycled ingredients? Please give an answer in the range of $0 - $20. | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	9.938	10.838	10.200	9.776
Std. Deviation	5.124	5.036	4.012	3.659
Minimum	0.000	0.000	0.000	2.000
Maximum	20.000	20.000	18.000	17.000

Descriptive Statistics

| | How many Canadian Dollars would you be willing to pay to purchase a Tomato & Mushroom Flatbread that has been made using upcycled ingredients? Please give an answer in the range of $0 - $14. | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	7.750	7.703	6.633	6.819
Std. Deviation	2.987	2.847	3.538	2.942
Minimum	2.000	1.000	0.000	2.000
Maximum	14.000	14.000	12.000	12.000

Descriptive Statistics ▼

| | How many Canadian Dollars would you be willing to pay to purchase a Classic Caesar Salad that has been made using upcycled ingredients? Please give an answer in the range of $0 - $12. | | | |
	Food Scraps x Economic Benefits	Food Scraps x Societal Benefits	Recoverable Food x Economic Benefits	Recoverable Food x Societal Benefits
Valid	32	37	30	29
Missing	0	0	0	0
Mean	5.875	6.500	5.917	5.284
Std. Deviation	2.780	3.606	2.798	2.637
Minimum	0.000	0.000	0.000	0.000
Maximum	12.000	12.000	10.000	10.000

Figure 3. Descriptive Statistics

ANOVA - Likert scale averages: Consuming once

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	1.118	1	1.118	1.526	0.219	0.012	0.012	0.004
Info Framing Condition	1.226	1	1.226	1.673	0.198	0.013	0.013	0.005
Language Label Condition ✳ Info Framing Condition	0.263	1	0.263	0.359	0.550	0.003	0.003	0.000
Residuals	90.847	124	0.733					

Note. Type III Sum of Squares

ANOVA - Likert scale averages: Usual consumption

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	0.279	1	0.279	0.330	0.567	0.003	0.003	0.000
Info Framing Condition	0.415	1	0.415	0.491	0.485	0.004	0.004	0.000
Language Label Condition ✳ Info Framing Condition	0.001	1	0.001	0.001	0.969	1.190×10^{-5}	1.198×10^{-5}	0.000
Residuals	104.775	124	0.845					

Note. Type III Sum of Squares

ANOVA - How many Canadian Dollars would you be willing to pay to purchase a Seeded Carrot Muffin that has been made using upcycled ingredients? Please give an answer in the range of $0 - $5. ▼

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	1.672	1	1.672	0.980	0.324	0.008	0.008	0.000
Info Framing Condition	0.004	1	0.004	0.002	0.964	1.647×10^{-5}	1.665×10^{-5}	0.000
Language Label Condition ✳ Info Framing Condition	0.592	1	0.592	0.347	0.557	0.003	0.003	0.000
Residuals	211.460	124	1.705					

Note. Type III Sum of Squares

ANOVA - How many Canadian Dollars would you be willing to pay to purchase a Black Forest Cake that has been made using upcycled ingredients? Please give an answer in the range of $0 - $8. ▼

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	1.117	1	1.117	0.243	0.623	0.002	0.002	0.000
Info Framing Condition	3.625	1	3.625	0.789	0.376	0.006	0.006	0.000
Language Label Condition ✳ Info Framing Condition	3.889	1	3.889	0.847	0.359	0.007	0.007	0.000
Residuals	569.486	124	4.593					

Note. Type III Sum of Squares

ANOVA - How many Canadian Dollars would you be willing to pay to purchase a bowl of Nasi Goreng that has been made using upcycled ingredients? Please give an answer in the range of $0 - $20.

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	5.069	1	5.069	0.245	0.622	0.002	0.002	0.000
Info Framing Condition	1.798	1	1.798	0.087	0.769	6.946×10^{-4}	6.997×10^{-4}	0.000
Language Label Condition ✳ Info Framing Condition	13.912	1	13.912	0.672	0.414	0.005	0.005	0.000
Residuals	2568.495	124	20.714					

Note. Type III Sum of Squares

ANOVA - How many Canadian Dollars would you be willing to pay to purchase a Tomato & Mushroom Flatbread that has been made using upcycled ingredients? Please give an answer in the range of $0 - $14.

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	31.735	1	31.735	3.353	0.069	0.026	0.026	0.018
Info Framing Condition	0.152	1	0.152	0.016	0.899	1.259×10^{-4}	1.293×10^{-4}	0.000
Language Label Condition ✳ Info Framing Condition	0.430	1	0.430	0.045	0.832	3.568×10^{-4}	3.665×10^{-4}	0.000
Residuals	1173.558	124	9.464					

Note. Type III Sum of Squares

ANOVA - How many Canadian Dollars would you be willing to pay to purchase a Classic Caesar Salad that has been made using upcycled ingredients? Please give an answer in the range of $0 - $12.

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Language Label Condition	10.928	1	10.928	1.200	0.275	0.009	0.010	0.002
Info Framing Condition	4.093×10^{-4}	1	4.093×10^{-4}	4.494×10^{-5}	0.995	3.551×10^{-7}	3.624×10^{-7}	0.000
Language Label Condition ✳ Info Framing Condition	12.534	1	12.534	1.376	0.243	0.011	0.011	0.003
Residuals	1129.257	124	9.107					

Note. Type III Sum of Squares

Figure 4. Two-way ANOVAs analyzing effect sizes

MANOVA: Pillai Test

Cases	df	Approx. F	Trace$_{Pillai}$	Num df	Den df	p
Language Label Condition	1	0.809	0.046	7	118.000	0.581
Info Framing Condition	1	0.465	0.027	7	118.000	0.858
Language Label Condition ✳ Info Framing Condition	1	0.930	0.052	7	118.000	0.486
Residuals	124					

Figure 5. Two-way MANOVA Pillai test for main effects and interaction significance

Appendix D
Team Member Contributions

Proposal
- Everyone participated in the proposal section.

Survey & Data Collection
- Survey:
Darren and Cindy (developing general survey structure and flow)
Darren (writing survey measurement questions, including questions on demographics)
Cindy (writing the condition-specific paragraph articles delineating study conditions in survey)
`Shuyi (sourcing survey pictures and prices and conducting necessary math to create WTP value ranges provided to participants in survey)`
Maxine (gathering information on base food prices)
Carol (revising survey questions wording)
Junyan Wang (editing)

-Data Collection:
Everyone posted on social media.
Shuyi, Cindy, Carol and Maxine send questionnaires offline on campus for people to fill out.

`-Data Analysis:`
Darren was mainly in charge of sorting data and running for the result on JASP.
Junyan also participated in the data analysis.

Presentation
- Slides: Shuyi, Maxine, Darren, Cindy, Carol, Junyan
-Presentation: Darren, Cindy

Final Report
-Everyone participated in the final report section.