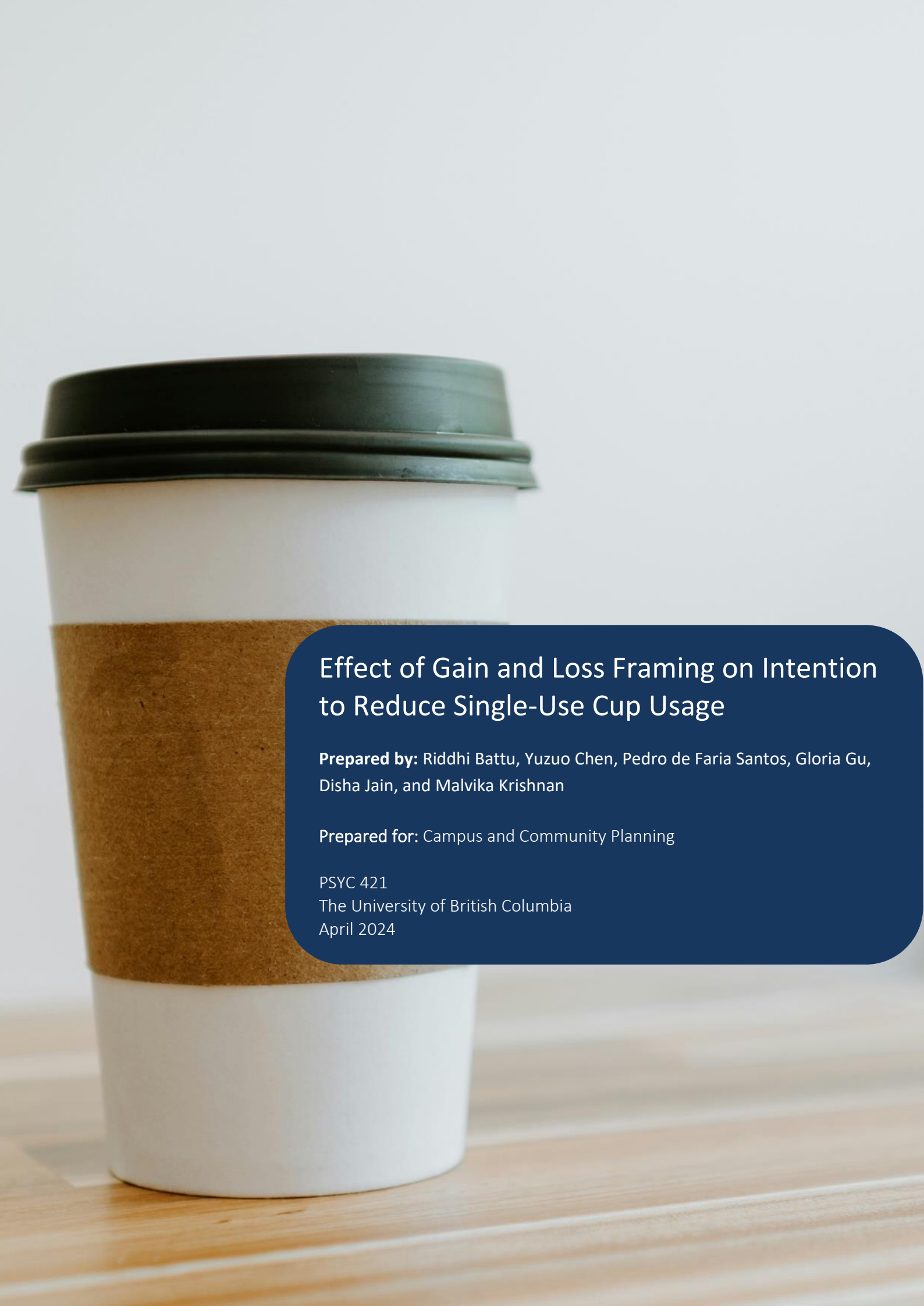

Effect of Gain and Loss Framing on Intention to Reduce Single-Use Cup Usage

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SEEDS Sustainability Program

Executive Summary

Introduction

Our study aims to find the effect that loss and gain framing has on changing consumers' self-reported intent to reduce the use of single-use cups.

Research Question

What is the effect that loss and gain framing have on changing consumer's self-reported intent to use single-use cups?

Methods

Using a Qualtrics survey, participants were assigned to either the control condition (a neutral statement that offers no insight into the experiment's focus), the loss framing condition (which focuses on the idea of losing money when buying a single-use cup), or the gain condition (focuses on the idea of saving money when not buying a single-use cup). We then asked them to complete a survey where a Likert Scale measures likeliness to examine our primary measure of consumer intention to reduce single-use cup usage and our secondary measure looking at intent to bring one's reusable mugs. A Likert Scale measuring surprise was also used to investigate how much people know about the cup fee as a tertiary measure.

Results

There was no significant difference in the gain, loss, and neutral frame in our primary measure, but significant effects in our secondary and tertiary measures. Although framing does not affect consumers' intention to reduce single-use cup usage, loss framing increases intentions to bring reusable cups, and both gain and loss framing can increase surprise about the 25-cent fee.

Recommendations

We believe that UBC should implement posters, particularly in high-traffic areas where individuals are more likely to make purchasing decisions related to beverages (i.e.., tills, entrance, etc.), combining the loss framing aspect of our research with the long-term financial consequences associated with purchasing a single-use disposable coffee cup ($100 lost over a year). Future research could explore the effects of framing in person at cafés and the effects of financial versus environmental implications of single-use cups. We also recommend exploring partnerships with service providers on campus that could more conveniently offer alternatives to single-use cups.

Table of Contents

Introduction

Disposable cups pose a serious environmental issue; Vancouver residents alone toss 82 million single-use cups into the garbage, costing taxpayers up to 2.5 million dollars every year[7]. UBC is doing its part to reduce this number through their Zero Waste Action Plan (ZWAP) 2030, which commits to reduce waste disposal by 50% from the 2019 estimate by 2030. UBC found that most coffee shops offer single-use cups as a default and people must request to use reusable cups[6]. Thus, single-use cups are the primary vessel for store-bought coffee and all those cups will end up as waste. Our SEEDS project aims to contribute to the ZWAP by creating meaningful strategies to reduce single-use cup usage on campus.

A strategy has already been implemented to reduce the use of single-use coffee cups on campus, where each cup will require a 25-cent fee[7]. However, our UBC client believes that most people are unaware of the current 25-cent charge initiative and challenged us to investigate whether this is true. Furthermore, if it is true and the current strategy is not working, what are new strategies that can be implemented?

The way information is framed can completely change the choice a consumer makes, making it a valuable research subject that's commonly associated with fields important to our daily lives such as behavioral economics and pro-environmental policies. As a result, we seek to investigate not only if our client's suspicion is true, but also how the framing of this information will affect consumer intentions with our experiment.

Tversky and Kahneman (1981) organized a variety of experiments to investigate various psychological principles involved in decision-making. They concluded that the effect of preferences on decision-making is a significant issue for the theory of rational choice, which refers to when an individual uses logical calculations when making decisions. Loss aversion, in particular, makes it so that people will feel more inclined to avoid a sure loss. This is explained by their hypothetical value function, where people value a loss more negatively than they value a gain positively. The paper points to the idea that since loss aversion makes people feel more upset when they lose rather than happy when they gain, framing something as a loss would elicit a stronger emotional response than framing something as a gain[5].

Understanding loss aversion helps to explain the primary focus of our experiment which is gain and loss framing. Indeed, Homar (2021), revealed that loss framing was more effective than gain framing in improving environmental intentions and behavior[4]. The feeling of loss is more effective at changing people's intentions, and thus framing things in a way that conveys losing out on something can be a useful tool in influencing decision-making.

Finally, past research has been done specifically on framing in the context of reducing single-use cup use[3]. Loss framing was better suited to increase reusable cup usage; as a charge on disposable cups helped promote reusable cups, but a discount did not have the same effect[3]. This indicates that the feeling of losing money (in the case of the fee) is more effective at getting people to change their behaviors than saving money (in the case of a discount)[3]. In our experiment, we will further examine the effects of gain and loss framing on the reduction of single-use cups, but instead of measuring direct behavior, we will focus on consumer's self-reported intentions to better understand what their decision-making process is like.

Research Question and Hypothesis

Past literature relates to our research goals regarding both environmental sustainability and the concepts we want to explore such as framing and loss aversion. Our current study explores a more specific question: What is the effect that loss and gain framing have on changing consumer's self-reported intent to use single-use cups?

Based on the hypothetical value function proposed by Tversky and Kahneman (1981) and the research done by Homar (2021), we hypothesize that framing the single-use cup fee as a loss will be more effective in reducing self-reported intent of using single-use cups versus framing it as a gain or with a neutral frame. Moreover, we also expect the gain frame to be more effective than the neutral frame.

Methods

Participants

In a power analysis (assuming minimum effect size = 0.2, alpha = 0.05, power = 0.80), our target sample size was a minimum of 246 participants, or 82 per condition (Appendix A Figure 8). The study was able to recruit more than the desired amount, and following the cleaning of our data, a final N = 253 was acquired. We collected data from a total of 258 participants but removed 5 participants due to null values. The study consisted of 179 UBC students, 50 non-UBC affiliated participants, 3 staff, 1 faculty member, and 10 participants who picked 'other' (alumni, transfer students, foreign residents). Additionally, 52.67% of our participants identified as females and 44.03% as males, while 2.05% were non-binary and 1.23% were left undisclosed. It is important to note that 10 participants did not provide us with their status at UBC and their gender. Lastly, our participants had approximately a mean age of 22 (SD = 4.9) and a median age of 21.

Conditions

Our experiment used a between-subjects design where participants were randomly assigned to three conditions: i) Loss Framing Condition: Participants were presented with a poster that emphasizes the financial losses of buying the cup through the usage of words and pictures (*N* = 86) (Appendix B Figure 4); ii) Gain Framing Condition: Participants were presented with a similar poster, but one that highlights the savings side of not using a single-use cup (*N* = 84) (Appendix B Figure 3); iii) No Framing Condition: This condition is the experiment's control condition, and used similar words and images to counteract any differences between the other two posters (*N* = 83). Participants were shown a poster that didn't give them any insight into the experiment, in an effort of having a baseline (Appendix B Figure 2). We chose to use repeat wording and imagery to represent the different framing techniques employed. This allows for consistency across the three conditions, minimizing the effects of any sort of third variable that could have influenced our results (e.g., word count differences).

Measures

We had 3 dependent measures all measured quantitatively with a seven-point Likert Scale[1]. Our primary dependent variable, '*How likely are you to reduce usage of single-use cups?',* is a direct measure of the research hypothesis. The secondary dependent variable, *'How likely are you to bring your own reusable cup when purchasing beverages?',* aims to look at self-reported intention that is indirectly associated with our research hypothesis. Lastly, the tertiary dependent variable, '*How surprising was the displayed information',* aims to gauge participants' surprise at their assigned condition. The questions were created and not taken from elsewhere, showing face validity. The Likert scale ranged from "Extremely Unlikely/Unsurprised" coded as 1 and "Extremely Likely/Surprised" coded as 7. A self-report measure for willingness was chosen since it is commonly used as a measure of pro-environmental behavior[2], and a self-report measure of surprise was chosen due to our client's interest in knowing the consumer's knowledge of the existing 25 cents charge.

Procedure

Our group's survey consisted of 3 different parts that adhered to the subsequent sequence: i) Consent Form: To inform participants about the study's purpose, procedures, and confidentiality agreement. ii) Gain/Neutral/Loss Conditions: Displayed one of our conditions and all of our dependent variable measures, randomly assigning participants to one of the three conditions. iii) Demographics: We asked participants for their status at UBC, their gender identity, age, and factors that would most likely reduce their single-use cup consumption. We opted to display the experimental condition before the demographics of the survey to limit any potential insight into our research hypothesis and question, reducing demand characteristics. Recruitment strategies included announcements by professors, posts on social media and class forums, and approaching UBC students on campus. The data collection process took 18 days, which included a minor issue with data embedding from the conditions. However, the issue was quickly resolved, leading to the loss of only a small amount of participants' results during that time frame.

Results

Employing R for our statistical analysis, we initiated our examination with the Shapiro-Wilk normality test to evaluate the distribution of our data, collected on a seven-point Likert scale. The test's outcome, indicating a departure from normal distribution, guided us toward the Kruskal-Wallis test for median comparison across groups. Significant findings from this test warranted further investigation through Dunn's post-hoc test to discern specific group differences.

Descriptive Statistics

Before delving into the effects of framing on consumer behavior, we present a comprehensive summary of descriptive statistics for each experimental condition (Control, Gain, Loss) across various measures. In the *Control condition*, participants exhibited a mean score of 3.83 (SD = 1.75, SE = 0.19) for the likelihood of reducing single-use cup usage (Q3), a mean of 2.50 (SD = 1.60, SE = 0.18) for the propensity to bring one's own reusable cup (Q2), and a mean surprise level at the information provided (Q4) of 3.17 (SD = 1.84, SE = 0.20). For the *Gain condition*, participants reported a slightly higher mean of 4.29 (SD = 1.87, SE = 0.20) for Q3, with means for Q2 and Q4 at 3.44 (SD = 1.82, SE = 0.20) and 3.44 (SD = 1.89, SE = 0.21), respectively. In the *Loss condition*, participants demonstrated the highest mean of 4.45 (SD = 1.87, SE = 0.20) for Q3, with means for Q2 and Q4 at 3.51 (SD = 1.73, SE = 0.19) and 4.02 (SD = 1.93, SE = 0.21), respectively (Appendix A Table 1). These statistics establish a foundational understanding of the response distribution within each experimental condition, providing essential context for the following inferential statistical analysis (Appendix A Figures 1, 2 and 3). Additionally, we surveyed participants on factors that would motivate them to reduce their use of single-use cups. They could select more than one option. The results showed that 37.8% (144) of respondents were influenced by awareness of environmental consequences. Close behind, 35.7% (136) cited financial implications as a motivating factor. Additionally, 25.5% (101) indicated that knowing about alternatives to single-use cups played a role in their decision-making (Appendix A Figure 6).

Inferential Statistical Analyses

i) Likelihood of Reducing Single-Use Cup Usage: Our investigation assessed the influence of loss and gain framing on consumers' intention to minimize the usage of single-use cups. Contrary to our hypothesis, informed by the seminal works of Tversky and Kahneman[5] (1981) and more recent studies by Homar (2021)[4], the Kruskal-Wallis test yielded a $\chi^2(2) = 5.252$, $p = .072$, suggesting a small effect size ($\eta^2 = .020$). This p-value, above the conventional alpha level of 0.05, denotes a lack of statistically significant differences in intentions to reduce single-use cup usage across the Control, Gain, and Loss conditions, not supporting our primary hypothesis (Appendix A Figure 4).

ii) Likelihood of Bringing Own Reusable Cup: Analyzing our secondary outcome, the Kruskal-Wallis test revealed statistically significant differences across conditions $\chi^2(2) = 8.761$, $p = .013$, with a modest effect size ($\eta^2 = .033$). Subsequently, Dunn's post-hoc analysis identified a significant difference between the Control and Loss conditions ($p = 0.0054$), indicating that loss framing notably enhanced the likelihood of participants intending to bring their own cup compared to the Control condition. No significant distinctions emerged between the Control and Gain conditions or between the Gain and Loss conditions,

underscoring the unique efficacy of loss framing in promoting pro-environmental behavior in this specific context (Appendix A Figure 5).

iii) Level of Surprise at Information: Regarding participants' surprise at the information about single-use cup charges, the Kruskal-Wallis test produced a significant finding $\chi^2(2) = 18.661$, $p < .001$, with an effect size of $\eta^2 = .068$. Further analysis via Dunn's test revealed significant differences between the Control vs. Gain ($p = 0.0007$) and Control vs. Loss ($p = 0.0001$) conditions, without a notable difference between the Gain and Loss conditions. This outcome suggests that framing, regardless of being gain or loss, elicited a higher level of surprise compared to the Control condition. However, the difference in surprise levels between the Gain and Loss frames was not significant (Appendix A Figure 6).

Discussion

Our results indicate that communication through framing techniques (loss/gain/neutral) had no statistically significant influence on consumer's self-reported intention to reduce single-use cups. However, it was shown that both loss and gain framing generated a statistically significant greater surprise response to the conditions, but interestingly, only loss framing led to consumer's increase in self-reported intention to use reusable mugs (i.e.., alternatives to single-use cups). Thus, our results refute our original assumption that loss framing will be more effective than gain and neutral framing for reducing single-use cup use, and conflicts with past research on the topic. Moreover, due to the nuances at play, we speculate that the concept of loss aversion[5] plays a role in the results, but does not explain everything.

The finding that loss framing had greater influence in increasing the likelihood of bringing a reusable mug, aligns with Poortinga and Whitaker's study[3], which explores how loss framing promotes reusable cup usage. However, our main finding goes against Homar's systematic review[4], which shows how loss framing was more effective than gain framing in improving environmental intentions and behavior[4]. Overall, we speculate that although consumers might be more willing to bring a reusable mug in response to the loss framing message, aligning with previous literature[3], they might not be as willing to reduce overall consumption of single-use cups, explaining the lack of difference between the two framing techniques (loss and gain) for our primary dependent variable. Therefore, we speculate that the trade-off of the financial implications of the decisions were not enough to outweigh the participant's personal preferences. Furthermore, the results from our tertiary dependent variable highlight the importance of communication strategies. It is not enough to let people know of the fee without giving them some sort of frame of reference, be it gain, or loss related. Moreover, despite the similar surprise response to the gain and loss framing, loss aversion[5] may explain why loss framing was more effective than gain and neutral framing scenarios in increasing self-reported intention to bring a reusable mug. As far as the lack of difference in between the gain and neutral conditions regarding the self-reported likelihood of bringing a reusable mug, we speculate that the indicated savings ($100 over the course of one year) were not significant enough to sway participants. To explore the mentioned nuances, future studies should compare a loss and a save over a longer period (5 years = $500), to make the financial implications appear more significant. Additionally, we suggest future studies to specify the type of single-use cup in question. For example, if participants are more willing to reduce single-use coffee cup consumption following exposure to the conditions. In conclusion, although our findings are conflicting in comparison to previous literature, it still leaves room to further explore the nuances of framing.

Limitations

Furthermore, it is important to bring attention to the limitations of our study. Even though self-report measures attempt to capture behavior that is not easily observable, broader literature states they are only weakly associated with actual behavior[2], posing a threat to the internal validity of our study. Additionally, we recommend future research to explore our conditions in a more realistic setting, to ensure generalization of our findings. For example, future research could explore our conditions in a more controlled environment, thereby increasing the internal validity of our findings. Lastly, despite obtaining our desired sample size, sample recruitment was a big challenge throughout the process. Next time, a wider

recruitment window and further participation incentives (i.e.., raffles) could facilitate the process.

Recommendations

Our findings indicate that the framing of messages is critical in communication strategies, which led to an increase in the likelihood of using reusable mugs as well as surprise. Therefore, our recommendation to our UBC client is focused on how information should be framed around the cafes on campus. We believe that UBC should implement posters, particularly in high-traffic areas where individuals are more likely to make purchasing decisions related to beverages (i.e.., tills, entrance, etc.), combining the loss framing aspect of our research with the long-term financial consequences associated with purchasing a single-use disposable coffee cup ($100 lost over a year). This opportunity presents itself in a relatively cost-effective and convenient manner to be implemented on a larger or smaller scale, varying according to the goals of our client.

Our survey was conducted through Qualtrics and given the previously mentioned limitations of self-report questionnaires, we propose that additional research could focus on the field implications of our findings. For example, it would be interesting to see how single-use coffee cup consumption in cafes on campus could be influenced before and after loss framing signage implementation. Additionally, given that environmental consequences were the most popular factor in influencing participants' decision of using single-use cups (Appendix A Figure 7), it would be interesting to further explore the influence that the signage containing both financial and environmental implications could have on consumers' preference for single-use cups. For example, perhaps including a photo of endangered wildlife or polluted environments to the loss-framing signage. Lastly, in our results we saw that a number of participants (N = 101) claimed that “preference for alternatives” would play a part in reducing their single-use cup consumption, and as such, we also recommend exploring partnerships with service providers on campus that could more conveniently offer alternatives to single-use cups. For example, a deposit-return program for the take-out of reusable mugs, such as MugShare.

In conclusion, we hope that our results and outcomes offer valuable insights to both our UBC client and the university community. Our work aims to guide future research endeavors leveraging message framing and hope that it plays a constructive role in aiding UBC in achieving its objectives concerning the Zero Waste Food Ware Strategy. Particularly, in reducing the consumption of single-use disposable coffee cups at the cafes located on campus.

References

[1] Heo, C. Y., Kim, B., Park, K., & Back, R. M. (2022). A comparison of best-worst scaling and Likert scale methods on peer-to-peer accommodation attributes. *Journal of Business Research*, *148*, 368–377. https://doi.org/10.1016/j.jbusres.2022.04.064

[2] Kormos, C., & Gifford, R. (2014). The validity of self-report measures of Proenvironmental Behavior: A meta-analytic review. *Journal of Environmental Psychology*, *40*, 359–371. https://doi.org/10.1016/j.jenvp.2014.09.003

[3] Poortinga, W., & Whitaker, L. (2018). Promoting the use of reusable coffee cups through environmental messaging, the provision of alternatives and financial incentives. *Sustainability*, *10*(3), 873. https://doi.org/10.3390/su10030873

[4] Ropret Homar, A., & Knežević Cvelbar, L. (2021). The effects of framing on environmental decisions: A systematic literature review. *Ecological Economics*, *183*, 106950. https://doi.org/10.1016/j.ecolecon.2021.106950

[5] Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*(4481), 453–458. https://doi.org/10.1126/science.7455683

[6] UBC Vancouver. (n.d.). *Zero Waste Food Ware Strategy*. Zero Waste Food Ware Strategy | UBC Campus & Community Planning. https://planning.ubc.ca/zero-waste-food-ware-strategy

[7] Vancouver, C. of. (n.d.). *Strategy background: How we got here*. Background | Single-Use Item Reduction Strategy | City of Vancouver. https://vancouver.ca/green-vancouver/background.aspx

Appendices

Appendix A

Condition	Measure	Mean	Standard Deviation
Control	Likelihood of Reducing Single-Use Cup Usage (Q3)	3.83	1.75
	Likelihood of Bringing Own Reusable Cup (Q2)	2.50	1.60
	Level of Surprise at Information (Q4)	3.17	1.84
Gain	Likelihood of Reducing Single-Use Cup Usage (Q3)	4.29	1.87
	Likelihood of Bringing Own Reusable Cup (Q2)	3.44	1.82
	Level of Surprise at Information (Q4)	3.44	1.89
Loss	Likelihood of Reducing Single-Use Cup Usage (Q3)	4.45	1.87
	Likelihood of Bringing Own Reusable Cup (Q2)	3.51	1.73
	Level of Surprise at Information (Q4)	4.02	1.93

Table A1: *Descriptive Statistics for the three conditions*

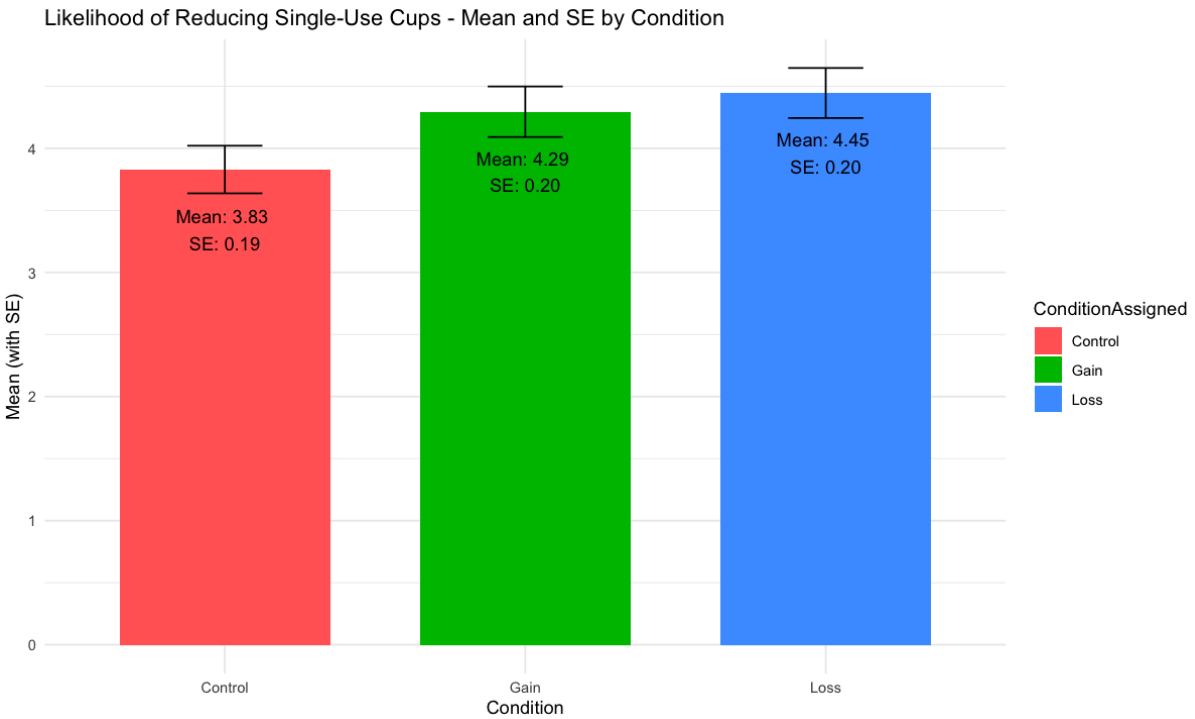

Figure A1: *Descriptive Statistics: Likelihood of Reducing Single-Use Cups*

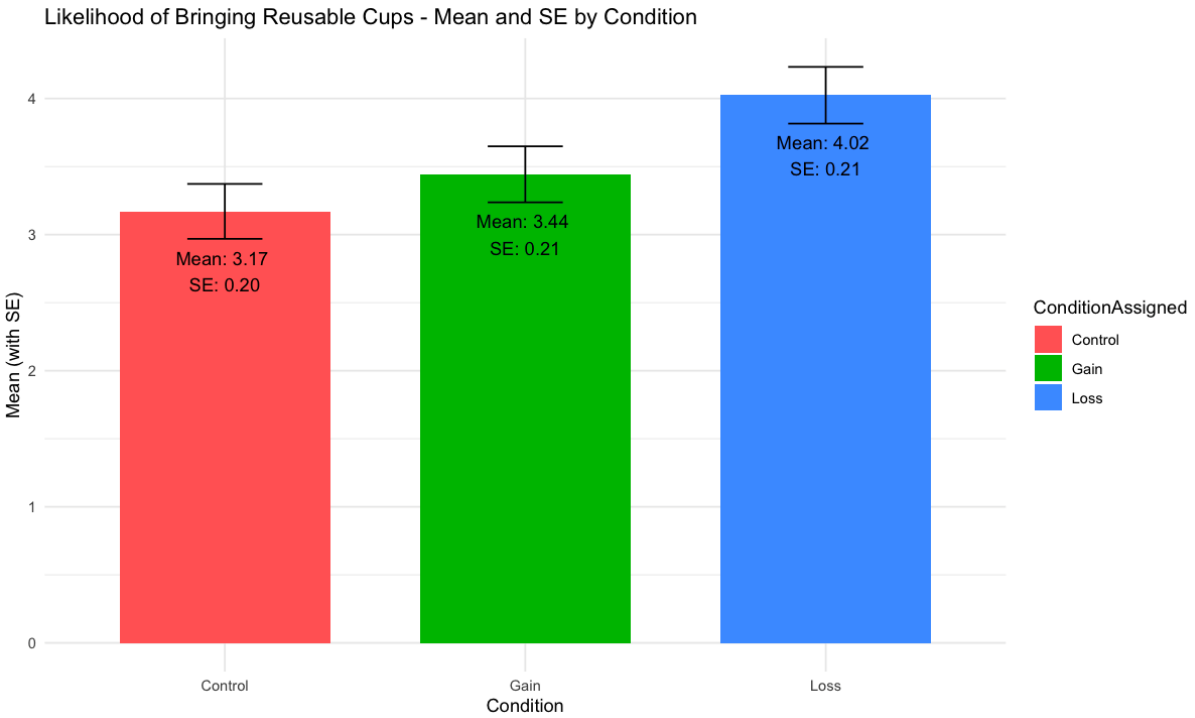

Figure A2: *Descriptive Statistics: Likelihood of Bringing Reusable Cups*

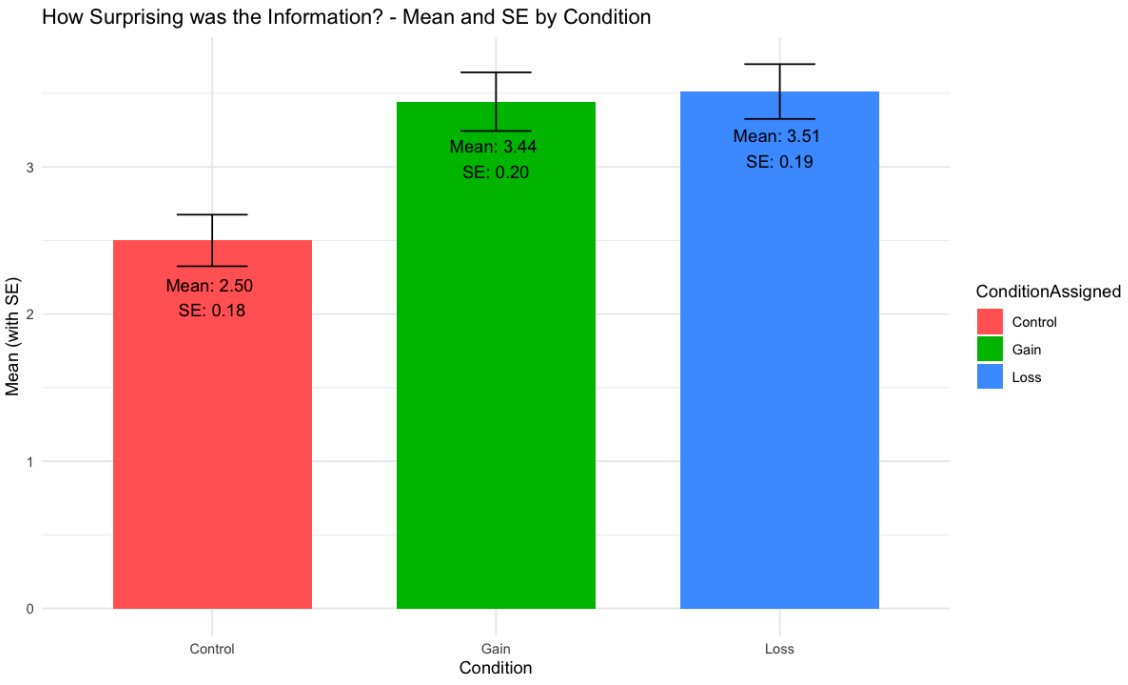

Figure A3: *Descriptive Statistics: How surprising was the information?*

```
        Kruskal-Wallis rank sum test

data:  Q3_combined by ConditionAssigned
Kruskal-Wallis chi-squared = 5.252, df = 2, p-value = 0.07237
```

Figure A4: *How likely are you to reduce single-use cups? Kruskal-Wallis test*

```
  Kruskal-Wallis rank sum test

data: x and group
Kruskal-Wallis chi-squared = 8.7613, df = 2, p-value = 0.01


                          Comparison of x by group
                                (Bonferroni)
Col Mean-|
Row Mean |    Control       Gain
---------+----------------------
    Gain |  -0.993219
         |     0.4809
         |
    Loss |  -2.913315  -1.889713
         |    0.0054*     0.0882

alpha = 0.05
Reject Ho if p <= alpha/2
```

Figure A5: *How likely are you to bring your own cup? Kruskal-Wallis test and Dunn's post-hoc*

```
   Kruskal-Wallis rank sum test

 data: x and group
 Kruskal-Wallis chi-squared = 18.6614, df = 2, p-value = 0


                           Comparison of x by group
                                 (Bonferroni)
 Col Mean-|
 Row Mean |    Control       Gain
 ---------+----------------------
     Gain |  -3.497620
          |    0.0007*
          |
     Loss |  -3.941016  -0.385454
          |    0.0001*     1.0000

 alpha = 0.05
 Reject Ho if p <= alpha/2
```

Figure A6: *Level of Surprise at Information: Kruskal-Wallis test and Dunn's post-hoc:*

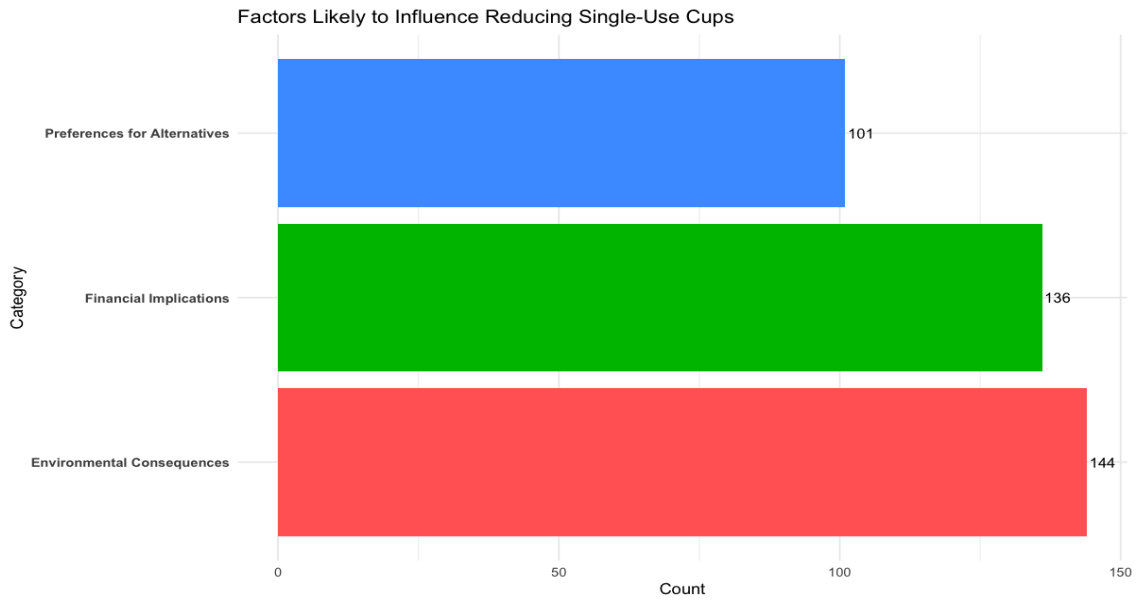

Figure A7: *Factors likely to influence reducing single-use cups*

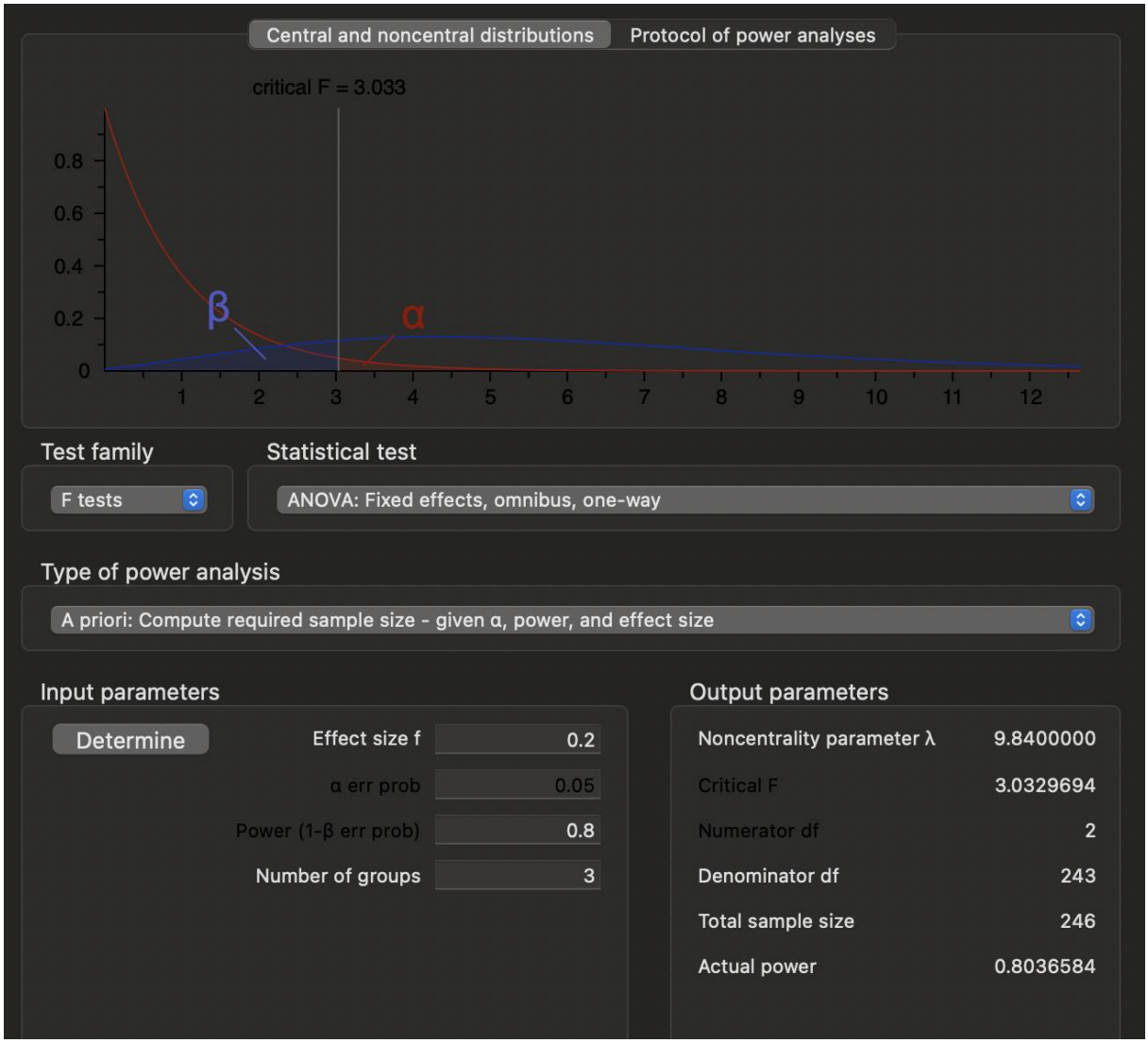

Figure A8: *Power Analysis*

Appendix B

Qualtrics Survey Screenshots in order of Consent Form - Control/Experimental Conditions - Demographics

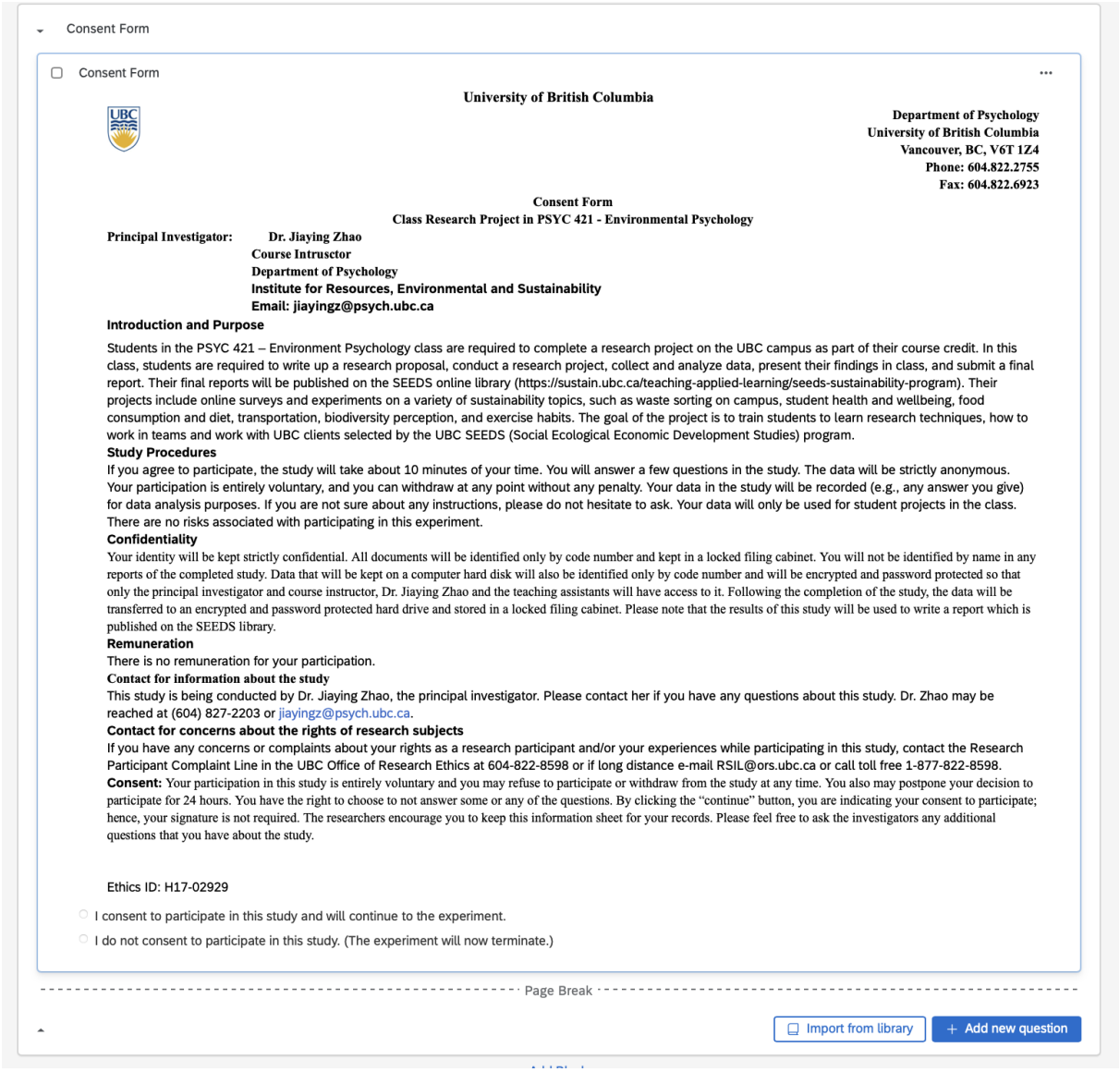

Figure B1: *Consent Form*

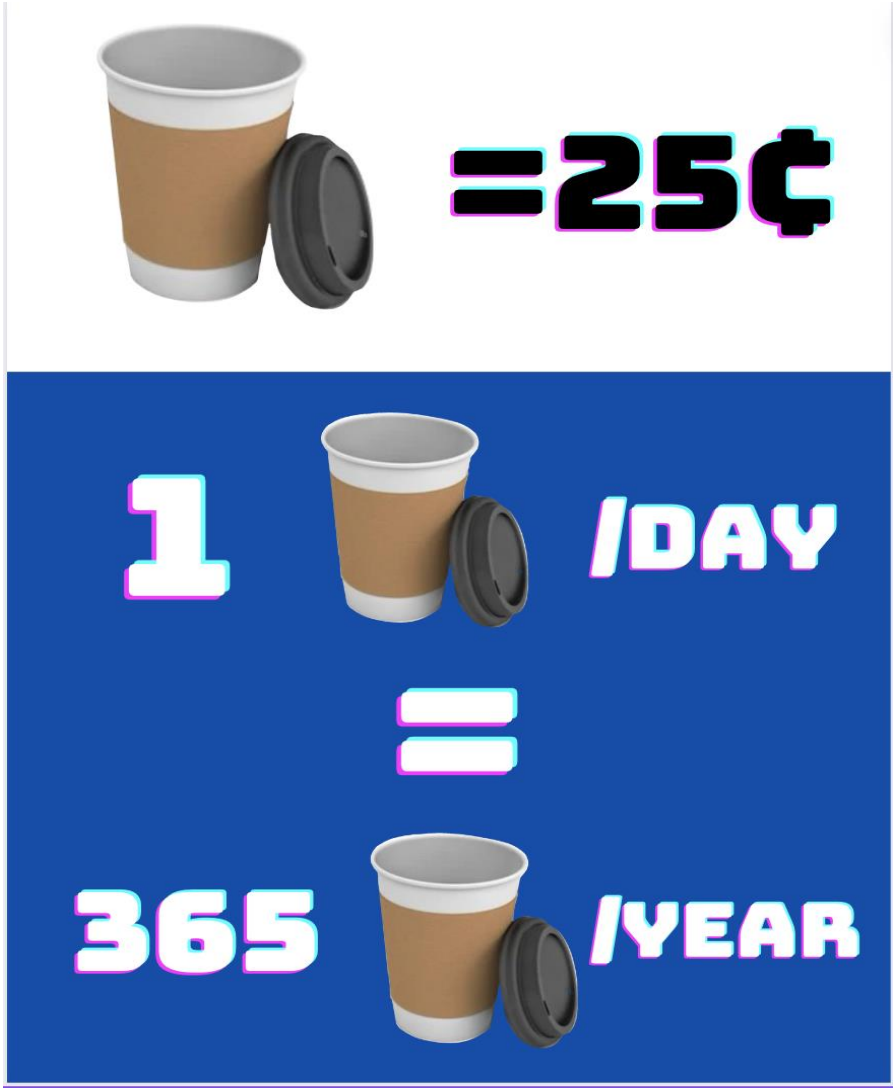

Figure B2: *Neutral Condition*

Figure B3: *Save Condition*

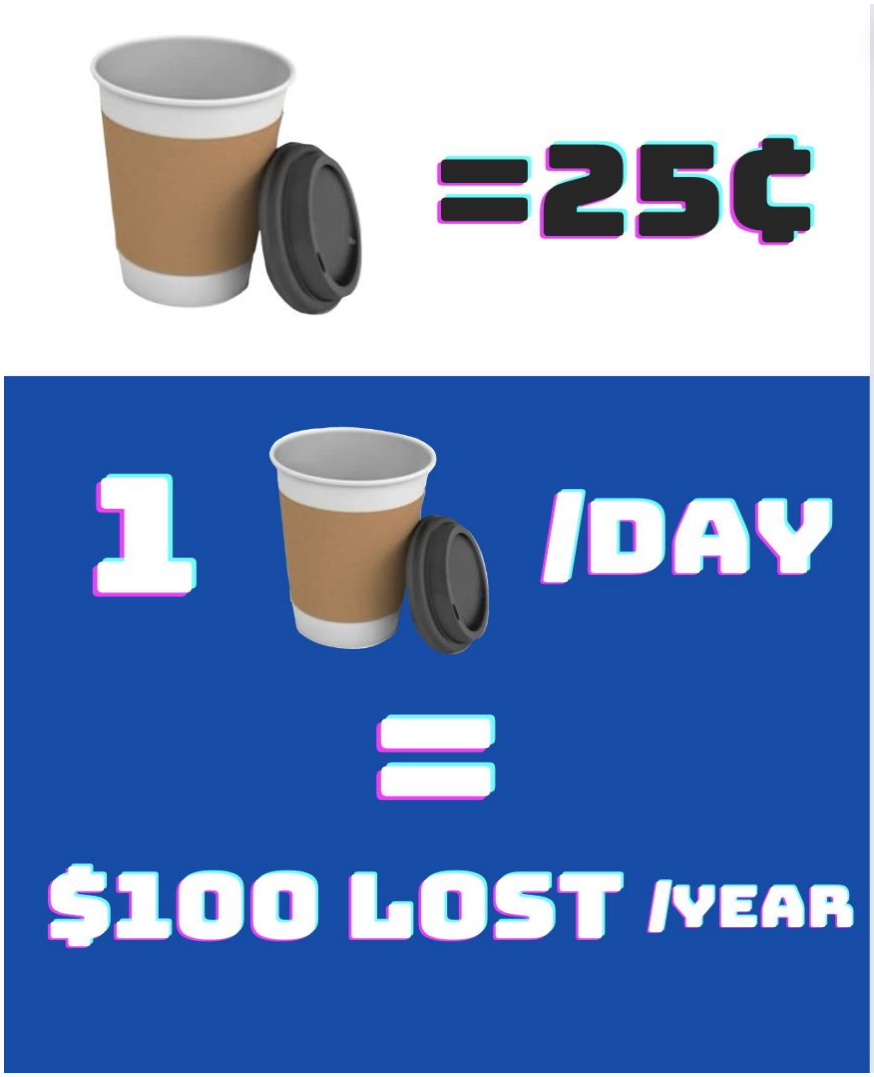

Figure B4: *Loss Condition*

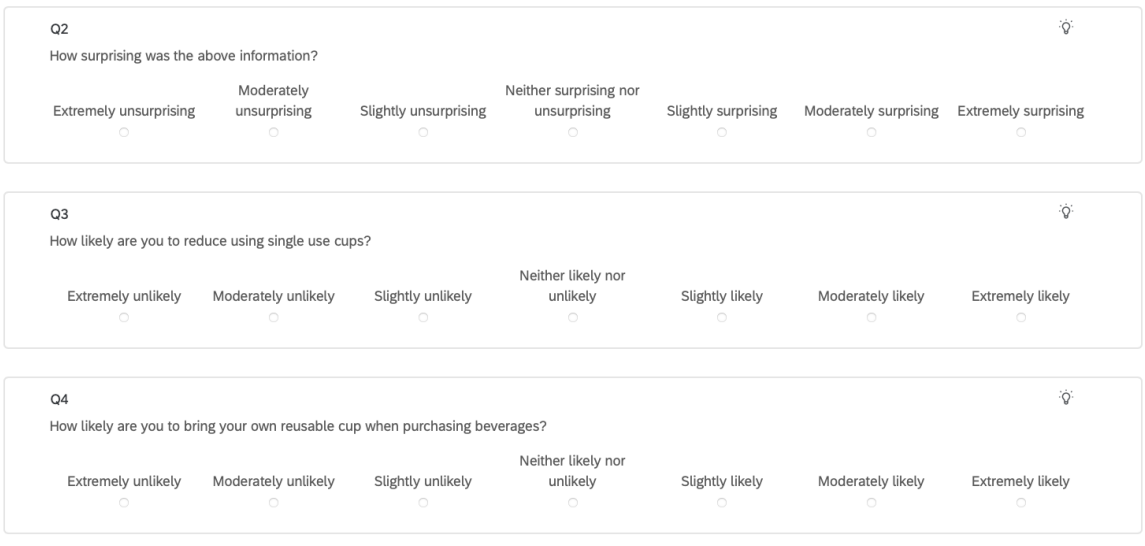

Figure B5: *Same Measure for Each Condition*

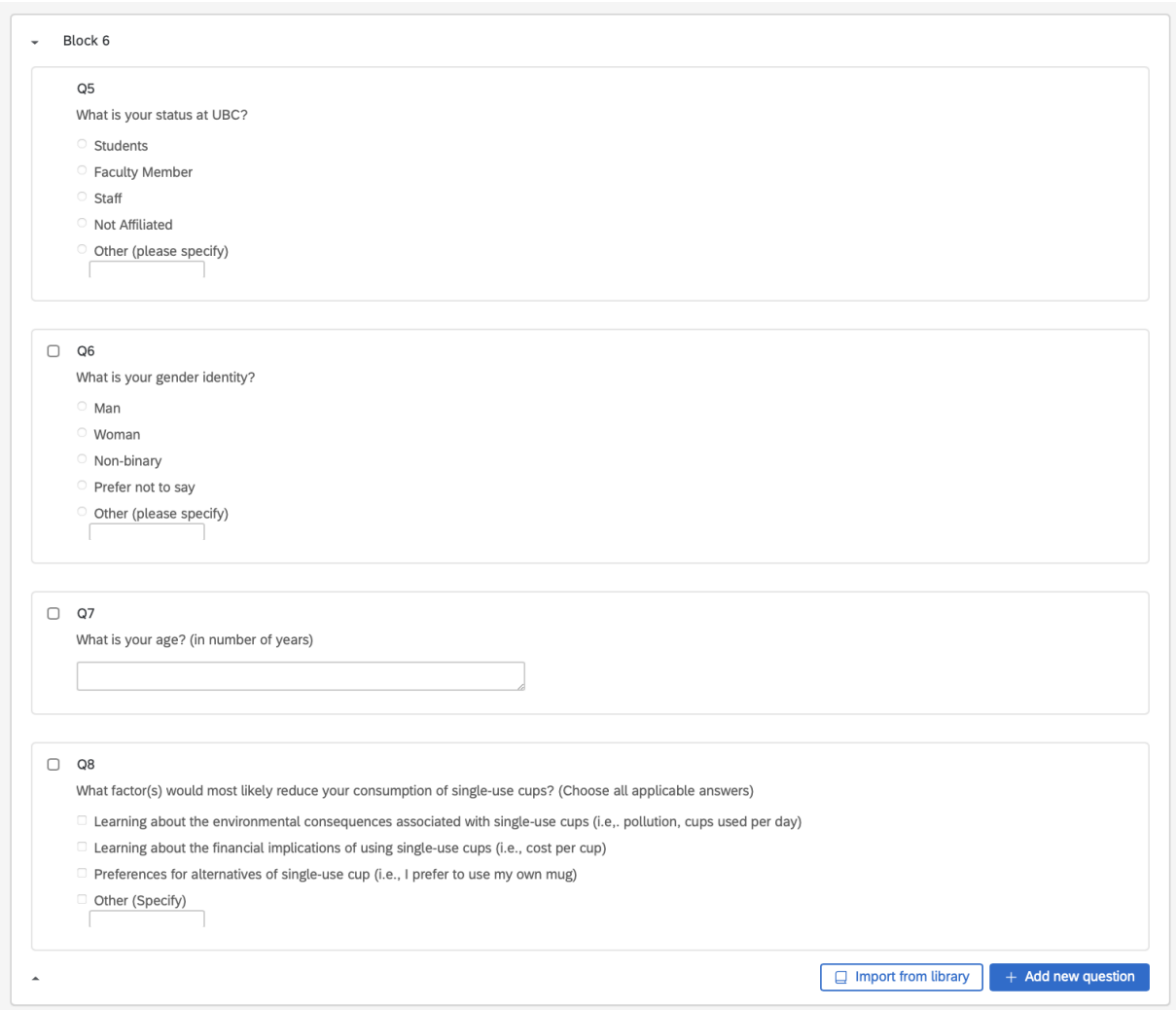

Figure B6: *Demographic Questionnaire*