**Introduction:**

Cava Grill is seeking a method to motivate non-purchasing consumers to make their first purchase. One suggested tactic is to give away a free item such as a free pita card. By providing an incentive for non-purchasing consumers to make their first Cava purchase, the potential long term loyalty and spending of the consumer will outweigh the initial cost of the incentive. In this proposal, Cava Data Science presents an experimental design and methodology for testing the success of the free pita card campaign.

**Problem statement:**

Will providing non-purchasing consumers with a free pita card when they first download the Cava app motivate them to make their first Cava purchase?

Our experimental design will seek to test the following hypotheses:

* Null hypothesis (H0): u >= 6.5 days
  + A non-purchasing consumer will make a purchase on or at least 6.5 days after receiving a free pita card when downloading the app.
* Alternative hypothesis (H1): u < 6.5 days
  + A non-purchasing consumer will make a purchase less than 6.5 days after receiving a free pita card when downloading the app.

**Methodology**

In order to test this problem, we must first define what a non-purchasing consumer is. Based on previously collected data (https://github.com/cavagrill/datachallenge/blob/master/data.csv), we have found that the average consumer who downloads the app makes their first Cava purchase in about 6.5 days, roughly a week.

Another constraint that must be established for this experiment is the budget for free pita cards. We would like to propose having 500 consumers in the treatment group, thus leading to a budget of $875 for this test (Pita chips are $1.45 as an extra topping).

To keep this experiment simple, during the testing phase we will randomly assign consumers who have just downloaded the Cava app to a control or treatment group. The control group will not receive a free pita card but will interact with the app as all customers do. The treatment group will receive a coupon within their app for a free pita. In total, there will be 1000 test subjects, 500 in the treatment group and 500 in the control. The groups will be stratified by gender as well. The final breakdown is as follows:

|  |  |  |
| --- | --- | --- |
|  | Male | Female |
| Control | 250 consumers | 250 consumers |
| Treatment | 250 consumers | 250 consumers |

This test will be run until all 1000 consumers have been assigned and at least 14 days have passed for each consumer from the time they downloaded the app. This gives us some buffer time to see if consumers will make a purchase even after the 6.5 day average, but also whether or not a purchase occurred before 6.5 days.

**Validating Results**

After collecting the results, Cava Data Science will perform a left-tailed test to determine whether or not the free pita card treatment resulted in a lower average purchase window. In particular, we will perform a one-sample t-test which is used when we collect data on a single sample drawn from a predefined population. Essentially, we will be comparing the mean purchase time from our selected treatment group to a known population (control group). A concern is that this data is not normally distributed, however this can be remedied with larger sample (n>500) sizes as we have done.

The t statistic is calculated by:

Mathematical Markup[[1]](#footnote-1)

Using this value of t and our number of consumers, we can calculate the p-value to determine whether or not we can reject the null hypothesis. This can be easily done by looking up a t-distribution critical values table. When testing hypotheses, it is common to require p-values of .05 or less to reject the null hypothesis and accept the alternative hypothesis. The p-value essentially tells us how likely or unlikely we are of observing a more extreme test statistic in the direction of the alternative hypothesis than the one observed.

**Future steps:**

Given more time, I would have devised this experiment in multiple stages. I would have defined “non-purchasing consumer” more rigorously. For example, based on previously collected data, we have found that 75% of Cava app users will have made their first purchase within 9 days after downloading the app. Since that data had such a significant positive skew, we can define a non-purchasing consumer as a consumer that has not made their first purchase after 20 days, which is about the 90th percentile of consumers. This may prove more insightful than using the average number of days since a consumer may end up purchasing from Cava regardless of receiving the free pita card, thus lowering the internal validity of the experiment. The experiment should be trying to narrow down on consumers who are truly not motivated and have no intention of going to Cava. It is more likely that these unmotivated consumers are the ones with the longest gap between downloading the app and not yet making a purchase.

Also, I would stratify the sampling in much more detailed ways. When downloading the app, users can select their food preferences as well as same basic demographic information. This offers a great opportunity to create segments of consumers by their location, age, and food preferences (vegetarian, gluten-free, etc).

1. http://ccnmtl.columbia.edu/projects/qmss/the\_ttest/onesample\_ttest.html [↑](#footnote-ref-1)