

# MKTG-607

Fall 2022

Team 3

## Final Report

### Business Decision & Learning Objective

Drexel's Career Cornerstone Group (CCG) wants to increase engagement and retention among graduates and undergraduate students. CCG is a voluntary, student-run organization that conducts events regularly to help students with their academic study. For this purpose, they have planned to conduct informational workshops which may benefit students in their career. To increase the participation of students, this workshop came up with various ideas out of which one is R Studio workshop, since it is useful for all the students from different analytics departments. CCG's objectives are specific statements that describe the skills, knowledge, and attitudes that participants will gain as a result of attending our workshop. Our learning objective is to capture the effectiveness of email advertising to students, along with testing different variations of email on students and the variation with the highest conversion. This experiment will help us determine which types of emails are most likely to have a different impact and be remembered by students without any reminders.

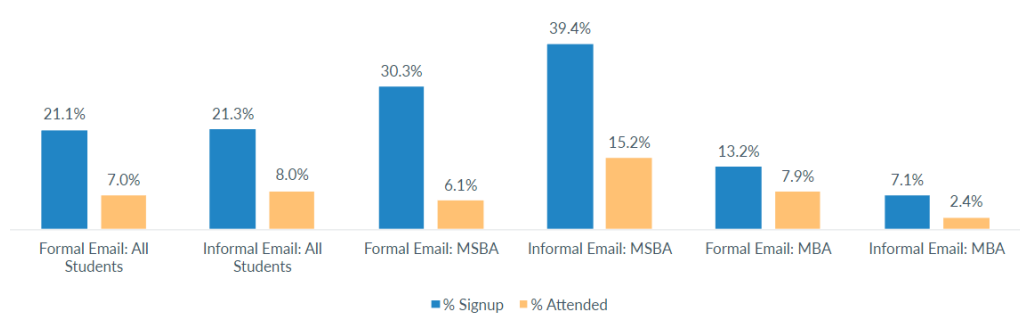
### Preliminary Experimental Design

For 'R Programming Workshop' we wanted to test if the design of the event's advertising email influences student's rate of attendance. We conducted the experiment by sending students advertising emails with different contents – one with 'Formal English' content and one with a more 'friendlier style content'. GSS (Graduate Student Services) sent out the emails on our behalf (student email list is not shared with Drexel students due to Privacy Policies of Drexel University). To ensure randomization for the experiment, student emailing list was divided into 2 parts, a. Students with last name (A - L) and b. Students with last name (M - Z). Although this is not ideal randomization, it was an easy solution to randomization where sending emails is carried out by GSS. The experiment had 1 factor with 2 levels as demonstrated in the following table:

| Factor                | Program | Level    | Sample size |
|-----------------------|---------|----------|-------------|
| Email Language Styles | MSBA    | Formal   | 33          |
|                       |         | Informal | 33          |
|                       | MBA     | Formal   | 38          |
|                       |         | Informal | 42          |

## Result and Analysis

The results of our experiments, in terms of the conversion rate for both signups and attendance are shown in the grouped bar chart below:

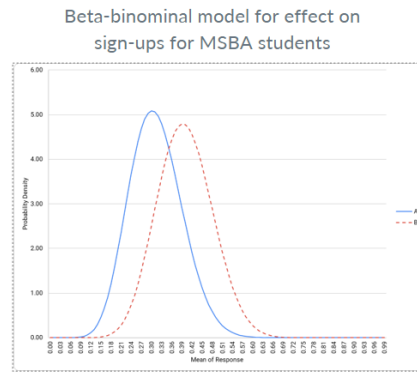


For all students, the two versions of emails had similar effects on signups that both had around 21% conversion rate. The informal email had a 1% higher attendance rate. After breaking students into different groups based on their programs, it can be noticed that formal emails had poorer effects on MSBA students but had higher rates for MBA students.

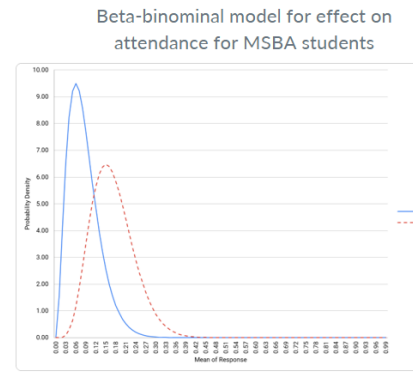
| Sign-up Rate | All Students |          | MSBA   |          | MBA    |          |
|--------------|--------------|----------|--------|----------|--------|----------|
|              | Formal       | Informal | Formal | Informal | Formal | Informal |
| X            | 15           | 16       | 10     | 13       | 5      | 3        |
| N            | 71           | 75       | 33     | 33       | 38     | 42       |
| Confidence   | 95%          | 95%      | 95%    | 95%      | 95%    | 95%      |
| Lower Limit  | -0.14        |          | -0.35  |          | -0.09  |          |
| Upper Limit  | 0.13         |          | 0.16   |          | 0.22   |          |

Above is an example of proportion test we did to find out if the difference is statistically significant. Other results can be found on the slide. The null hypothesis was that there is no difference in the conversion rate between formal and informal emails. The test of proportion showed that all three 95% confidence intervals for sign-up rate among all students, MSBA students and MBA student calculated included 0. For attendance rate, the 95% confidence intervals for attendance rate among all students, MSBA students and MBA student included 0. This means that we failed to reject the null hypothesis, and informal and formal emails had the same effects on sign-up rate and attendance rate.

We also applied a different measure of Bayesian Test to test if there is truly no effect from the emails, as our sample size was small. First, we assumed that both emails had the same priors. As we didn't have historical data to define which email had better performance before, we set the alpha and beta in the priors all equal to 1.



| CI(95%)      | Email A | Email B |
|--------------|---------|---------|
| Low          | 0.177   | 0.247   |
| High         | 0.469   | 0.562   |
| $P(pA > pB)$ | 0.207   |         |



| CI(95%)      | Email A | Email B |
|--------------|---------|---------|
| Low          | 0.019   | 0.068   |
| High         | 0.192   | 0.308   |
| $P(pA > pB)$ | 0.118   |         |

The result of Bayesian test can also be found in the slide. The example above showed the beta-binominal model figure for effect on sign-up rate and attendance rate for MSBA students, and the calculated credible intervals and probabilities. The model figure also showed which email had higher mean response rate. For MSBA students, the probability that informal email (Email B) is better on sign-ups and attendance is all above around 80%. For MBA students the probability that formal email (Email A) had higher influence is above 80%. However, for all students the probability that one email is better is just around 50%, and it can be defined which version is better.

Overall, our test gave us a result that the difference on sign-up rate and attendance rate is not significant for all students. However, informal emails had better performance on students from different programs.

## Potential Confounds

During the experiment, we tried to mitigate all external factors that might influence students' decision to sign up and attend the event. However, there were still a few confounds that might compromise or affect our results. Firstly, we do not have any historical data on the usual number of sign-ups or attendances for an event hosted by CCG. This affects our ability to determine if the number of sign-ups and attendances we had is normal or not. Secondly, many students might not be able to attend the event, because it was happening on the November 28<sup>th</sup>, which is right after Thanksgiving break and near final week. Thirdly, because we did not truly randomize our sample size, there could be some underlying bias within our experiment. Last but not least, other factors outside of our emails could lead the students to sign up for the event. For example, it is common for students to share helpful events with others. Also, because the advertisement emails came from the academic advisors, it is likely that students regard the emails with high importance and sign up for the event without consideration of the email content.

## Recommendations & Future Improvements

Based on our proportional test result, we conclude that there is no difference between the effects of formal and informal language style emails. The Bayesian test result, on the other hand, shows that MSBA students preferred the informal email, while the MBA students responded better to the formal email. Due to the mix of results between two testing methods, we consider our overall result to be inconclusive. As of now, we would recommend CCG to be flexible with language styles for their email advertisement, as long as it is appropriate and fits the nature of the event.

We believe that further testing is needed to determine if language style influences student signup rates. To get a more robust result, we would prefer to conduct the experiment on larger sample size – meaning other students outside of MSBA and MBA should also be included in the experiment. We would also want to have full access to the student's email address to be certain on the randomization. Lastly, as R programming was a very technical-intensive topic, we would run the experiment on an event that is more social-like and relevant to various academic programs.