A/B Testing
RESULTS - Report

GloBox

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GLOSSARY

Confidence Interval   A range of values so defined that there is a specified probability that the value of a parameter lies within it.

Standard Error   A measure of the statistical accuracy of an estimate.

Margin Error   Degree of uncertainity that a statistic might have

Standard Deviation   A measure of how the data differs in relation to the mean.

Conversion Rate   Describes the relationship between visits/clicks on a website to conversions

Hypothesis   A supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation.

p-value   The probability that a particular statistical measure will be greater than or equal to (or less than or equal to in some instances) observed results.

Significance Level   The probability of deciding to reject the null hypothesis when the null hypothesis is true

Source   Oxford Language

EXECUTIVE SUMMARY

Goal

This report presents the results of an A/B test conducted by GloBox's Growth team to raise awareness and increase revenue for its food and drink product category.

A/B Testing

The A/B test featured a banner highlighting key products in the category "foods and drinks" as a treatment for the test group, while the control group did not see the banner.

The analysis of the results showed that the banner did not result in a statistically significant increase in revenue for the test group compared to the control group.

Result

Based on these findings, **we recommend that GloBox implements the banner** highlighting key products in its website's food and drink category.

We recommend **further research** to identify other strategies for increasing awareness and revenue for this category.

CONTEXT

Background

GloBox's food and drink product category has experienced significant growth in recent months.

However, the company has found that this category needs to be more well-known among its customer base than its boutique fashion items and high-end decor products.

To address this issue and increase revenue for the food and drink category, we decided to run an A/B test that highlighted key products in this category as a banner at the top of the website. The control group (Group A) does not see the banner, and the treatment group (Group B) sees the new banner.

Hypothesis

The hypothesis for the A/B test was that the banner highlighting key products in the food and drink category would result in a statistically significant increase in revenue for the test group compared to the control group.

The reasoning behind this hypothesis was that the banner would draw attention to the food and drink category and encourage customers to explore the products available.

Additionally, the banner would provide social proof by highlighting popular and high-quality products, further incentivizing customers to purchase.
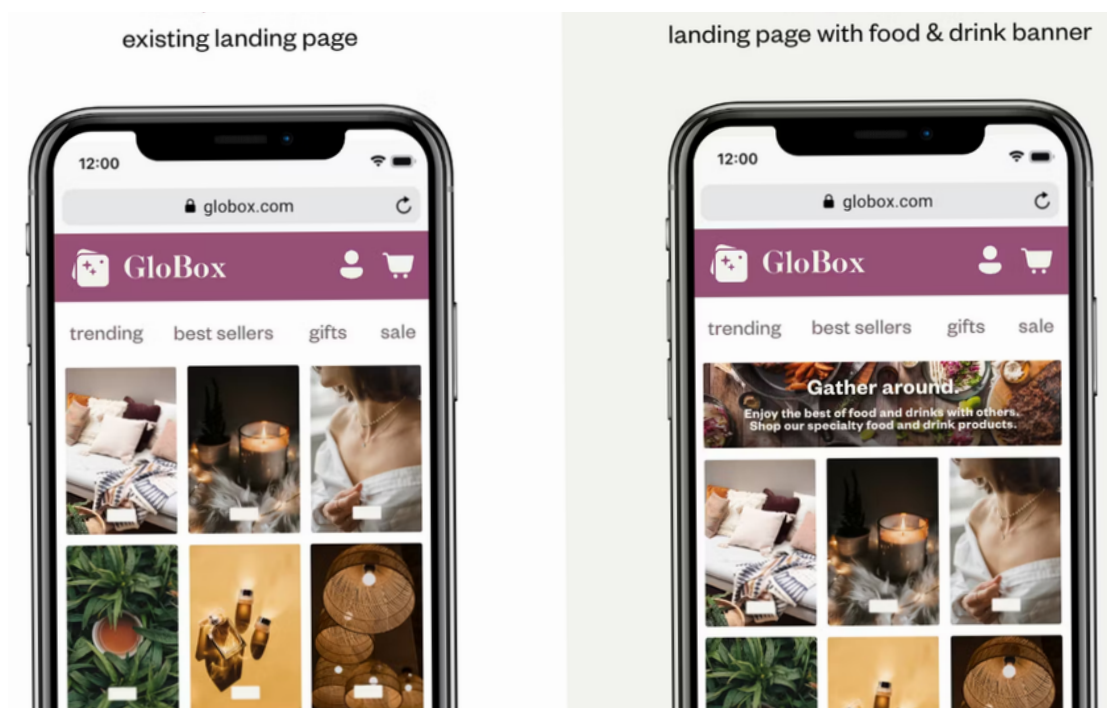
METHODOLOGY

The test ran for 30 days and randomly assigned customers who visited the GloBox website to either the test or control group.

Customers in the test group saw a banner at the top of the website highlighting key products in the food and drink category, while customers in the control group did not see the banner.

The decision to have a different sample size for each group was based on the availability of traffic to the website during the test period. To ensure that the sample size for each group was large enough to produce statistically significant results, we aimed for a minimum of 700 users who actively made a purchase (active users).

After the test period, we analyzed the results using A/B Testing to determine if there was a statistically significant difference in revenue between the test and control groups.

Based on the results of the A/B test, we determined whether highlighting key products in the food and drink category as a banner on the website effectively increased revenue for this category.

A/B TEST SET UP - SUMMARY

TEST PERIOD

The experiment ran from Feb st, 2023 - April 30th, 2023, 30 days

SAMPLE SIZE

The control group consisted of 24,343 unique visitors and 955 active users. While the test group consisted of 24,600 unique visitors and 1139 active users.

DESIGN

The treatment group in the A/B test was shown a banner at the top of the website highlighting key products in the food and drink category, while the control group was not shown the banner.
The banner was designed to encourage customers to explore the food and drink category and make a purchase. The test is run only on the mobile website.

METRICS

Users may or may not purchase products from the website. A user can make purchases on multiple days. If a user makes one or more purchases, it is considered a "conversion."
The metric used for the test was revenue generated, and we used a two-sample t-test and a z-test to determine if there was a statistical difference in revenue between the test and the control group.

GOAL

Based on the results of the A/B test, we were able to determine whether highlighting key products in the food and drink category as a banner on the website was effective in increasing revenue for this category.

ANALYSIS AND INTERPRETATION

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DATA USED

The data is stored in a relational database in three tables, as seen in the figure below.

users	groups	activity
user demographic information	*user A/B test group assignment*	*user purchase activity, containing 1 row per day that a user made a purchase*
id — *the user ID*	**uid** — *the user ID*	**uid** — *the user ID*
country — *ISO 3166 alpha-3 country code*	**group** — *the user's test group*	**dt** — *date of purchase activity*
gender — *the user's gender (M = male, F = female, O = other)*	**join_dt** — *the date the user joined the test (visited the page)*	**device** — *the device type the user purchased on (I = iOS, A = android)*
	device — *the device the user visited the page on (I = iOS, A = android)*	**spent** — *the purchase amount in USD*

The A/B test used data from three tables: "users", "groups", and "activity". The "users" table included demographic information such as country, gender, and id for each user.

The "groups" table contained information about which A/B test group each user was assigned to, the join date, the first time a user visited the page and whether the user accessed the page with an ios or Android device.

Finally, the "activity" table contained information about user purchase activity, with one row per day that a user made a purchase and the amount that has been spent in USD as well as also here the device type with which the user made the purchase.

This data was used to evaluate the effectiveness of a banner promoting food and drink products on GloBox's website.

ANALYSIS AND INTERPRETATION

PREPROCESSING

Before conducting the A/B test, we merged all three tables and left out the irrelevant columns; some data cleaning and preprocessing steps were taken.

Duplicate and invalid data were removed from the "users" and "activity" tables, and missing data were imputed where possible.

The data from the three tables were then combined into a single dataset for analysis.

It should be noted that the dataset used in the analysis represents a sample of the population, and any findings or conclusions drawn from this sample may not necessarily be representative of the entire population.

ANALYSIS TOOLS

We used SQL to query and revise the data in the database.

We use Spreadsheets for Data Analysis as it provides built-in functions to perform the calculations, such as the confidence interval.

We utilized Tableau to generate graphs that effectively visualize the statistical data.

We employed Python to visualize curved graphs, effectively illustrating the relationship between variables.

ANALYSIS AND INTERPRETATION

STATISTICAL APPROACH

T-test to construct confidence intervals and perform hypothesis testing for the mean amount spent between the two groups.
In our case, to find out whether we can detect a significant increase in revenue by using the banner, we compare the average amount spent between the control and treatment groups.

Z-test to construct confidence intervals and perform hypothesis testing of the proportions, in our case, the conversion rate between the two groups in order to evaluate whether the user responds to the banner with a call to action.

ANNONTATION

We are setting the significance level from the beginning to avoid introducing bias in the analysis and ensure an objective decision-making process.
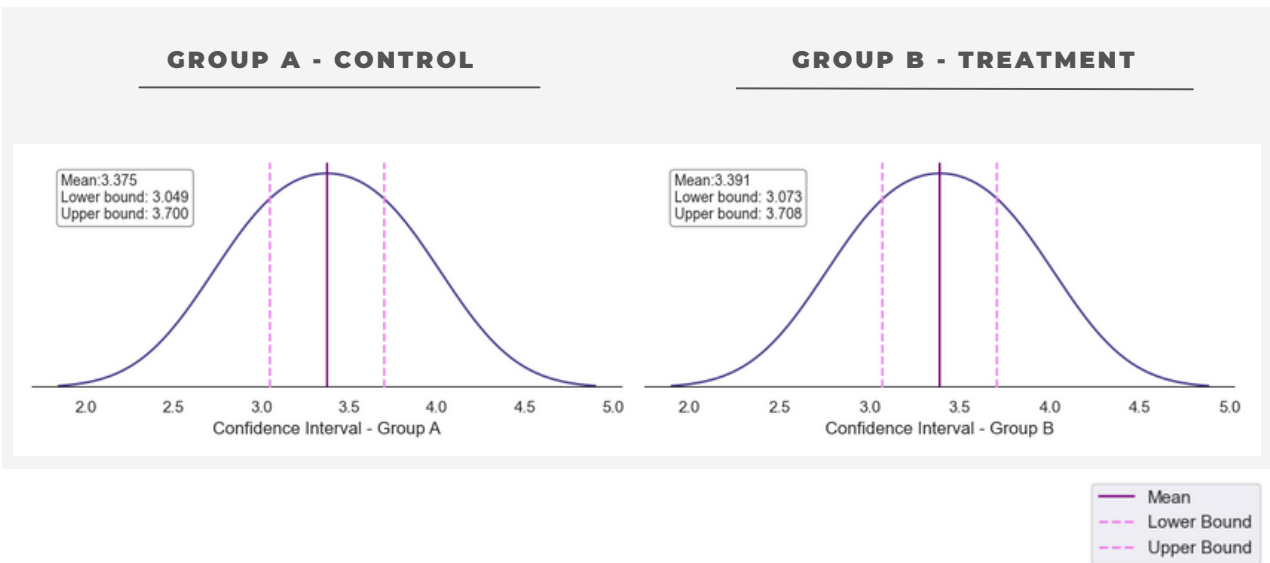The level of significance is set at 0.05.

It is important to recognize that variability is not under our control; rather, a result of various factors that contribute to the uniqueness of each observation, such as individual differences or other unaccounted variables.

ANALYSIS AND INTERPRETATION

AVERAGE AMOUNT SPENT

Values	Control Group - A	Treatment Group- B
Sample Mean	3.375	3.391
Standard Deviation	25.936	25.414
Sample Size	24343	24600
Margin of Error	0.32583	0.31760
Mean Confidence Interval	[3.049 ; 3.700]	[3.073 ; 3.708]

CONFIDENCE INTERVALL FOR AVERAGE AMOUNT SPENT

GROUP A - CONTROL

Mean:3.375
Lower bound: 3.049
Upper bound: 3.700

Confidence Interval - Group A

GROUP B - TREATMENT

Mean:3.391
Lower bound: 3.073
Upper bound: 3.708

Confidence Interval - Group B

— Mean
--- Lower Bound
--- Upper Bound

ANALYSIS AND INTERPRETATION

AVERAGE AMOUNT SPENT

Hypothesis Test

Difference Mean Group B - Group A	0.01634847796
Standard Error	0.2321405588
p-value	0.9438497659
95% Confidence Interval for the average amount spent between Group A and Group B	[-0.439; 0.471]

p-value: 0.9439
Confidence Interval: [-0.4386, 0.4714]

Difference in Means
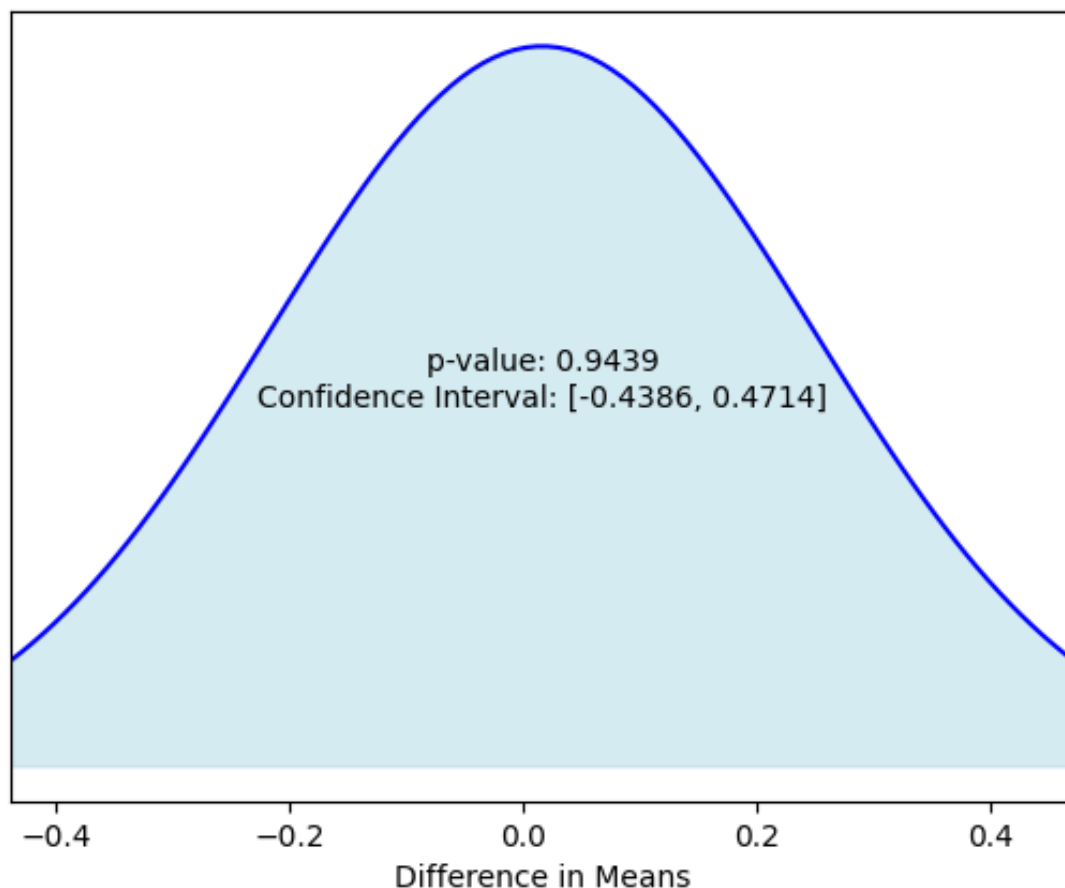
ANALYSIS AND INTERPRETATION

AVERAGE AMOUNT SPENT

A p-value of 0.9434 indicates that the results are statistically insignificant and that there is not enough evidence to reject the null hypothesis .

There is no strong evidence to conclude that there is a statistically significant difference in the average amount spent between the two groups.
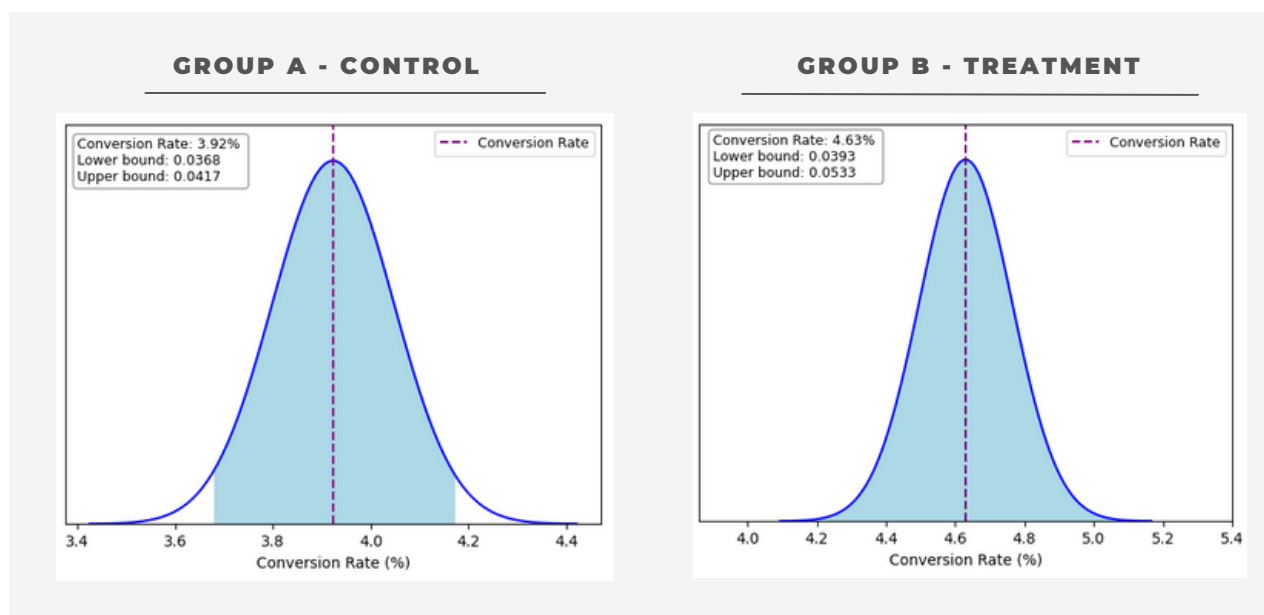
Overall, the results of the A/B test suggest that highlighting products in the food and drink category as a banner on the website did not significantly impact the revenue for this category.

ANALYSIS AND INTERPRETATION

CONVERSION RATE

Values	Control Group - A	Treatment Group- B
Sample Size	24343	24600
Observations	955	1139
Conversion Rate	0.03923 3.92%	0.04630 4.63%
Conversion Rate Confidence Interval	[0.0368 ; 0.0417]	[0.0437 ; 0.0489]

CONFIDENCE INTERVALL FOR CONVERSION RATE

GROUP A - CONTROL

Conversion Rate: 3.92%
Lower bound: 0.0368
Upper bound: 0.0417
--- Conversion Rate

GROUP B - TREATMENT

Conversion Rate: 4.63%
Lower bound: 0.0393
Upper bound: 0.0533
--- Conversion Rate

ANALYSIS AND INTERPRETATION

CONVERSION RATE

Hypothesis Test

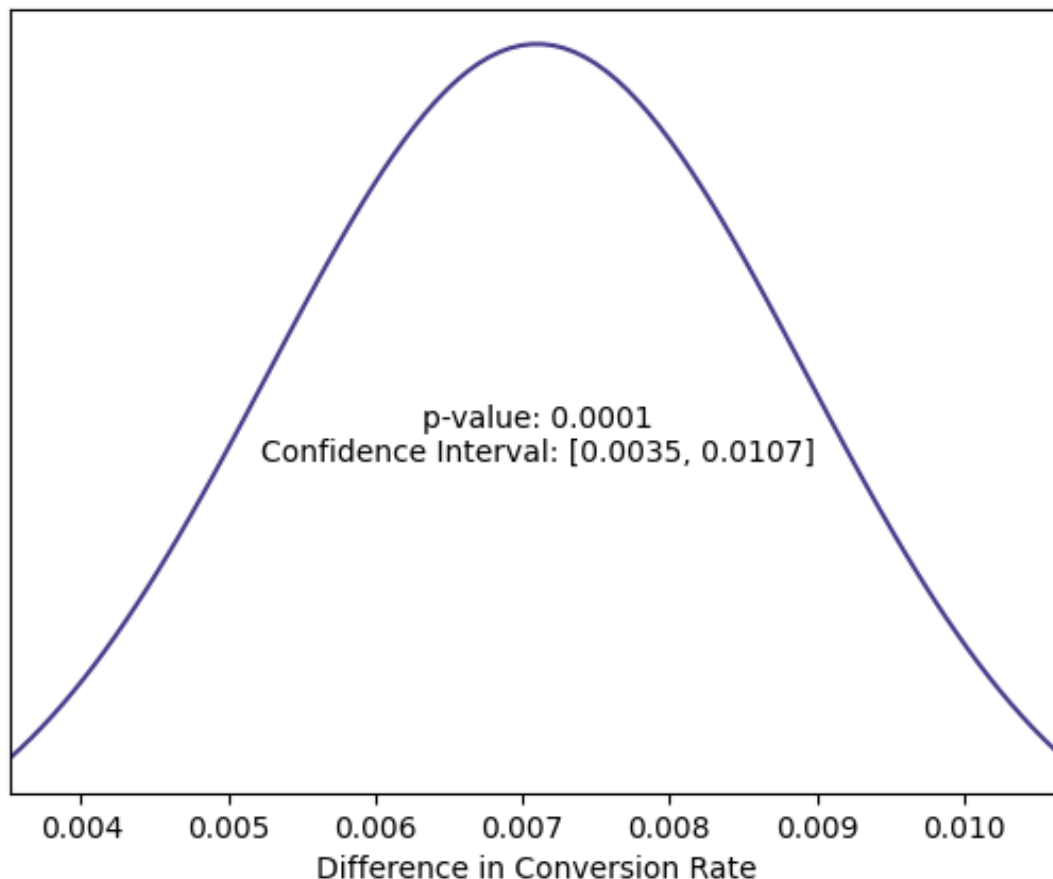|	
Standard Error	0.001828488403
z-statistic	-3.866484779
p-value	0.0001104153519
95% Confidence Interval for diffrence in the conversion reate between group A and group B	[0.0035 ; 0.0107]

p-value: 0.0001
Confidence Interval: [0.0035, 0.0107]

Difference in Conversion Rate

ANALYSIS AND INTERPRETATION

CONVERSION RATE

A p-value of 0.0001 indicates that the results are statistically significant and
that there is strong evidence to reject the null hypothesis.

There is strong evidence to conclude that there is a statistically significant difference in the conversion rate between the two groups.

Overall, the results of the A/B test suggest that highlighting key products in the food and drink category as a banner on the website did significantly impact the conversion rate for this category.

RESULTS - SUM UP

AVERAGE AMOUNT

- Difference statistically insignificant

- The banner did not have a significant impact on the average amount spent

- This suggests that the presence of the banner did not significantly impact the average amount spent by customers.

CONVERSION RATE

- Difference statistically significant

- The banner had a significant impact on the conversion rate

- This implies that the banner successfully influenced customers to explore and purchase products in the food and drink category.

RECOMMENDATION

IMPLEMENT THE BANNER

Since the banner significantly impacted the conversion rate, it would be advisable to continue using it.
It successfully attracted more users to explore the food and drink category, indicating its effectiveness in generating interest and engagement. By implementing the banner can help to drive more sales and potentially attract new customers

CONDUCT A LONGER TEST

Extending the test period to a month can provide a more robust dataset and allow for a more comprehensive analysis.
It allows us to capture also more user behaviour and draw more reliable conclusions.

ANALYSE PRICE AND PRODUCT CATEGORIES

Take a closer look at the sales data within the food and drink category, particularly focusing on the number of products sold and the distribution of selling prices. This analysis will help you understand whether the lack of significant difference in the average amount spent is influenced by the price categories or the types of products being sold.
It may also provide insights into potential areas for optimization, such as highlighting higher-priced or more popular items.

RECOMMENDATION

EXPLORE REPEAT ORDERS

As food and drink products are consumable goods, analyzing whether customers make repeat orders within this category can be valuable.
This will help us to understand the customer's loyalty and engagement levels and provide insights into the long-term revenue potential of the food and drink category.

CONSIDER ADDITIONAL FACTORS

Consider other factors influencing customer behaviour, such as product reviews, promotions, or personalized recommendations.
Testing and analyzing these factors alongside the banner can provide us a more comprehensive understanding of the impact on customer behaviour and overall revenue.

Overall, we believe that by implementing these recommendations, GloBox can continue to improve its approach to highlighting food and drink products on the website and increase revenue in this product category.

THANK YOU

GloBox

For further inquiries or questions,
please contact:

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APPENDIX

GRAPHS

LINKS

Link to Google Drive

Link to Tableau

Presentation

Database Table

users	groups	activity
user demographic information	*user A/B test group assignment*	*user purchase activity, containing 1 row per day that a user made a purchase*
id *the user ID*	**uid** *the user ID*	**uid** *the user ID*
country *ISO 3166 alpha-3 country code*	**group** *the user's test group*	**dt** *date of purchase activity*
gender *the user's gender (M = male, F = female, O = other)*	**join_dt** *the date the user joined the test (visited the page)*	**device** *the device type the user purchased on (I = iOS, A = android)*
	device *the device the user visited the page on (I = iOS, A = android)*	**spent** *the purchase amount in USD*

Table 1: "users"
Columns:

id (integer): a unique identifier for each user
country (string): the country where the user is located
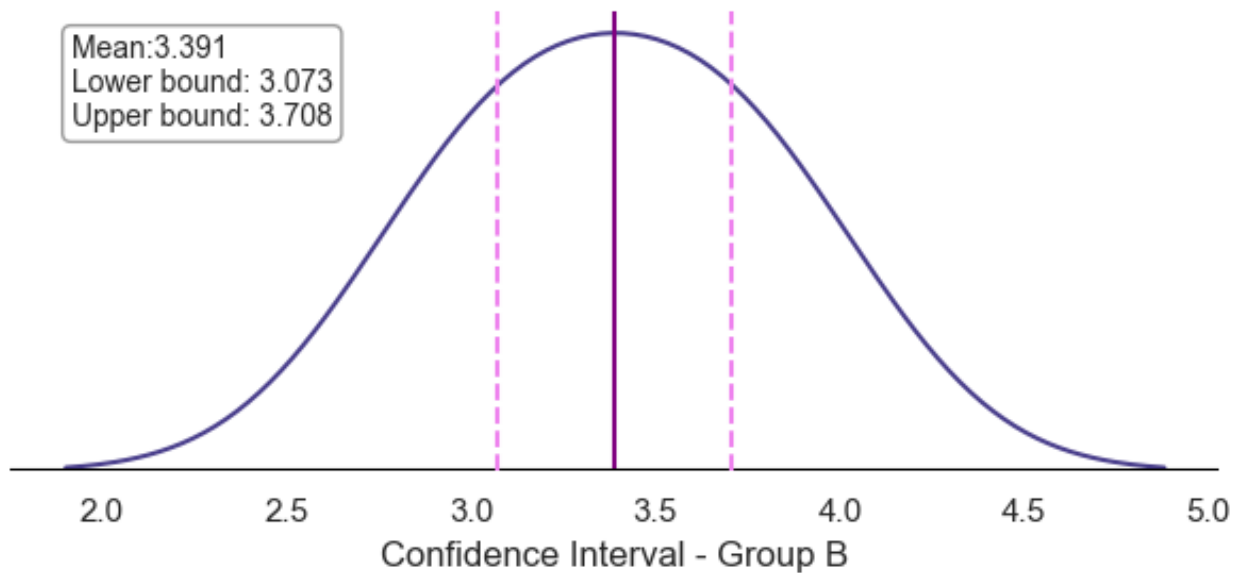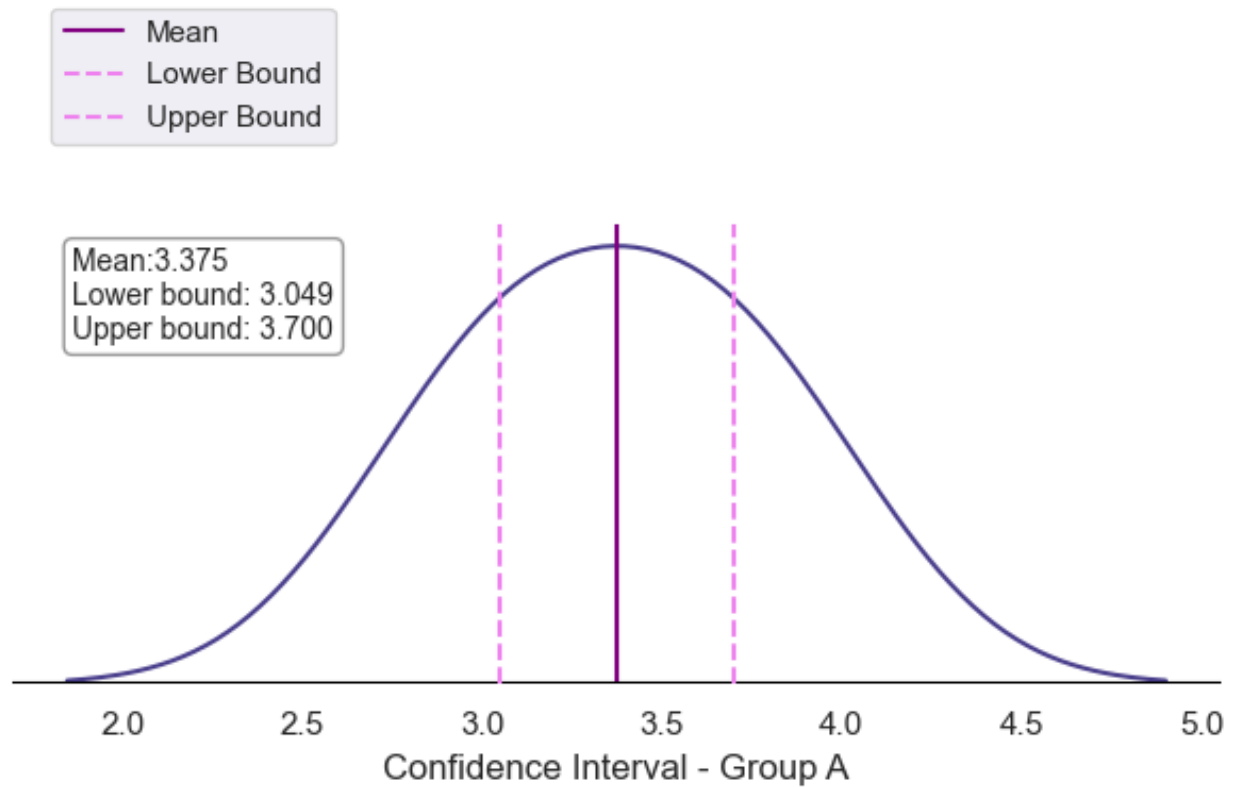gender (string): the gender of the user

Table 2: "groups"
Columns:

uid (integer): a unique identifier for each user
group (string): the group that the user belongs to
join_dt (date/time): the date/time when the user joined the group
device (string): the device that the user used to join the group
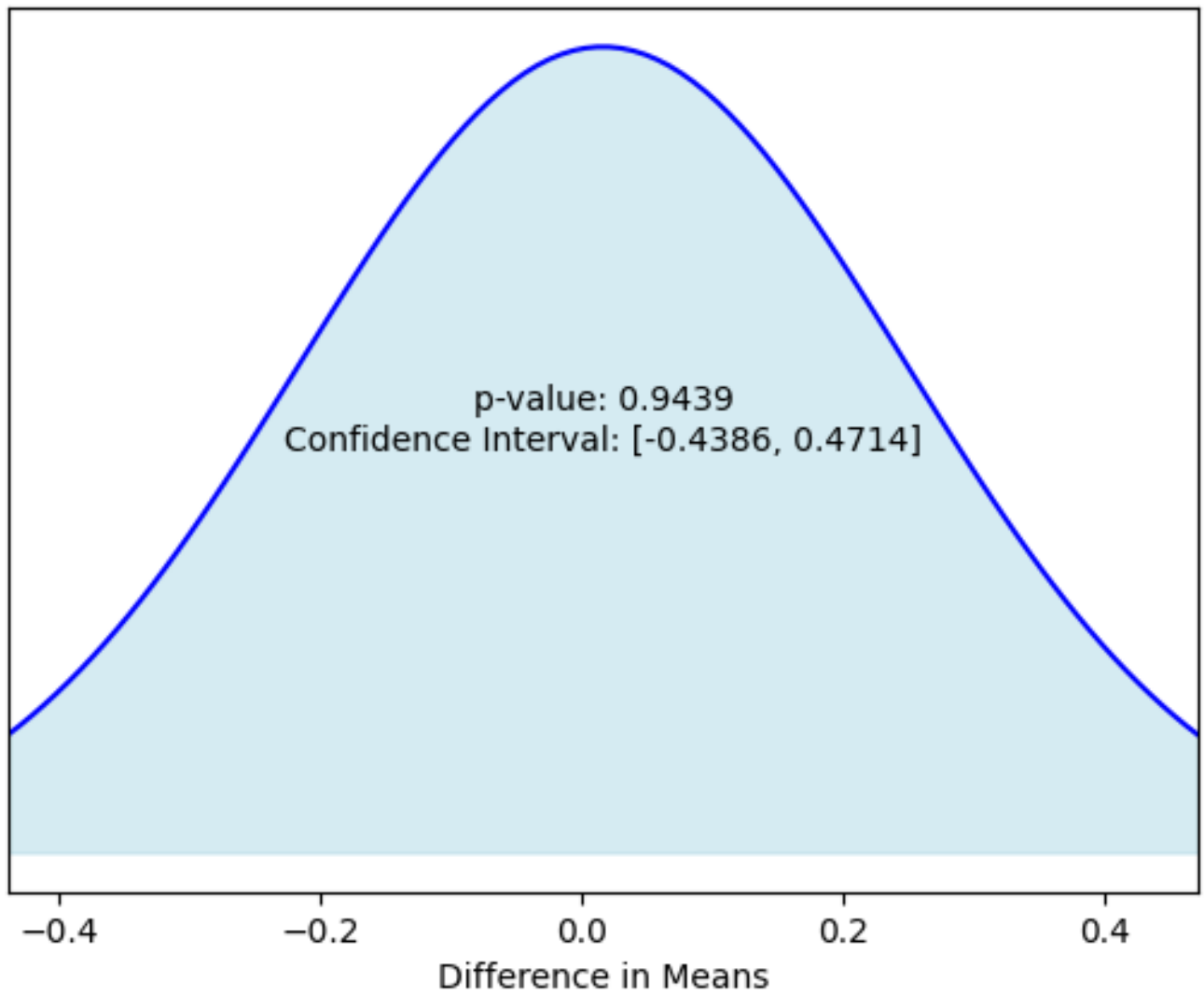
Table 3: "activity"
Columns:

uid (integer): a unique identifier for each user
dt (date/time): the date/time when the user performed an activity
device (string): the device that the user used to perform the activity
spent (integer): the amount of time (in seconds) that the user spent performing the activity
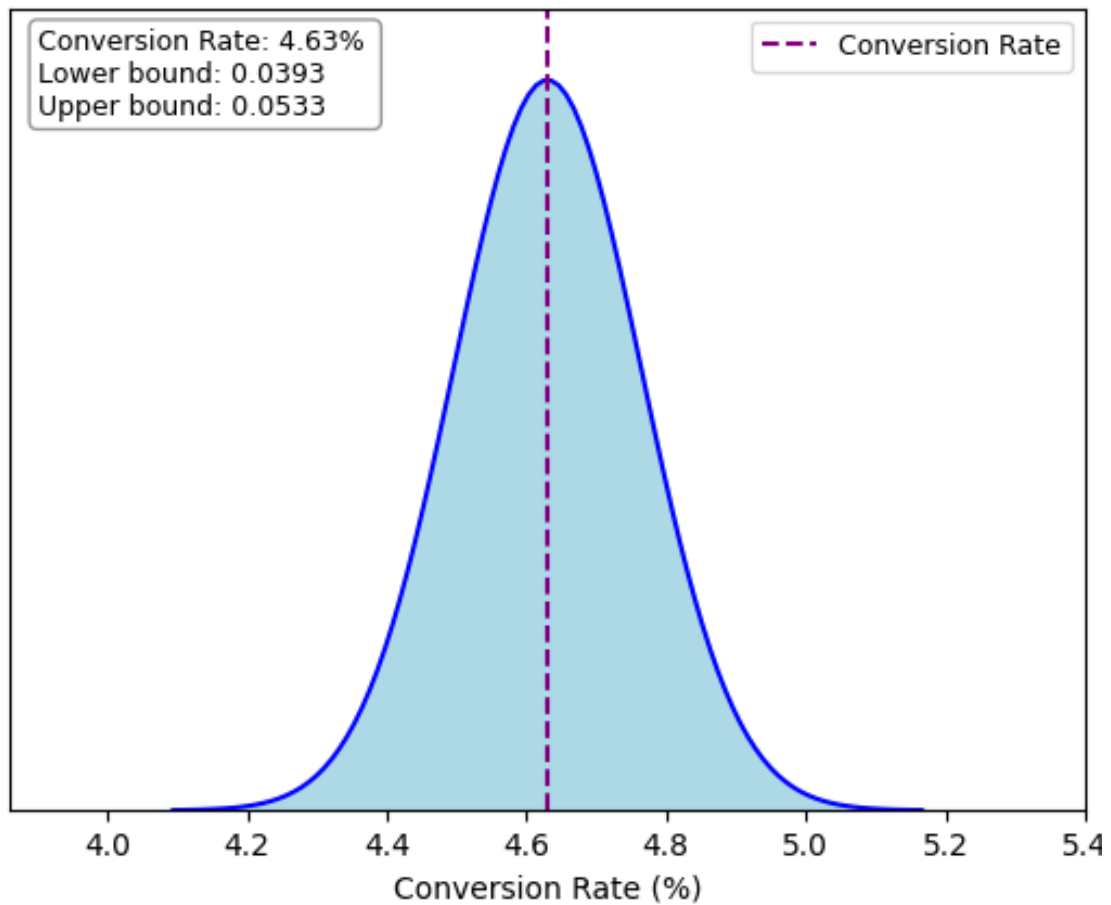
Confidence Interval _ Mean

Legend:
- Mean
- Lower Bound
- Upper Bound

Mean:3.375
Lower bound: 3.049
Upper bound: 3.700

Confidence Interval - Group A

Mean:3.391
Lower bound: 3.073
Upper bound: 3.708

Confidence Interval - Group B

Hypothesis _ Mean

p-value: 0.9439
Confidence Interval: [-0.4386, 0.4714]

Difference in Means

Confidence Interval - Conversion Rate

Conversion Rate: 3.92%
Lower bound: 0.0368
Upper bound: 0.0417

Conversion Rate

Conversion Rate (%)

Conversion Rate: 4.63%
Lower bound: 0.0393
Upper bound: 0.0533

Conversion Rate
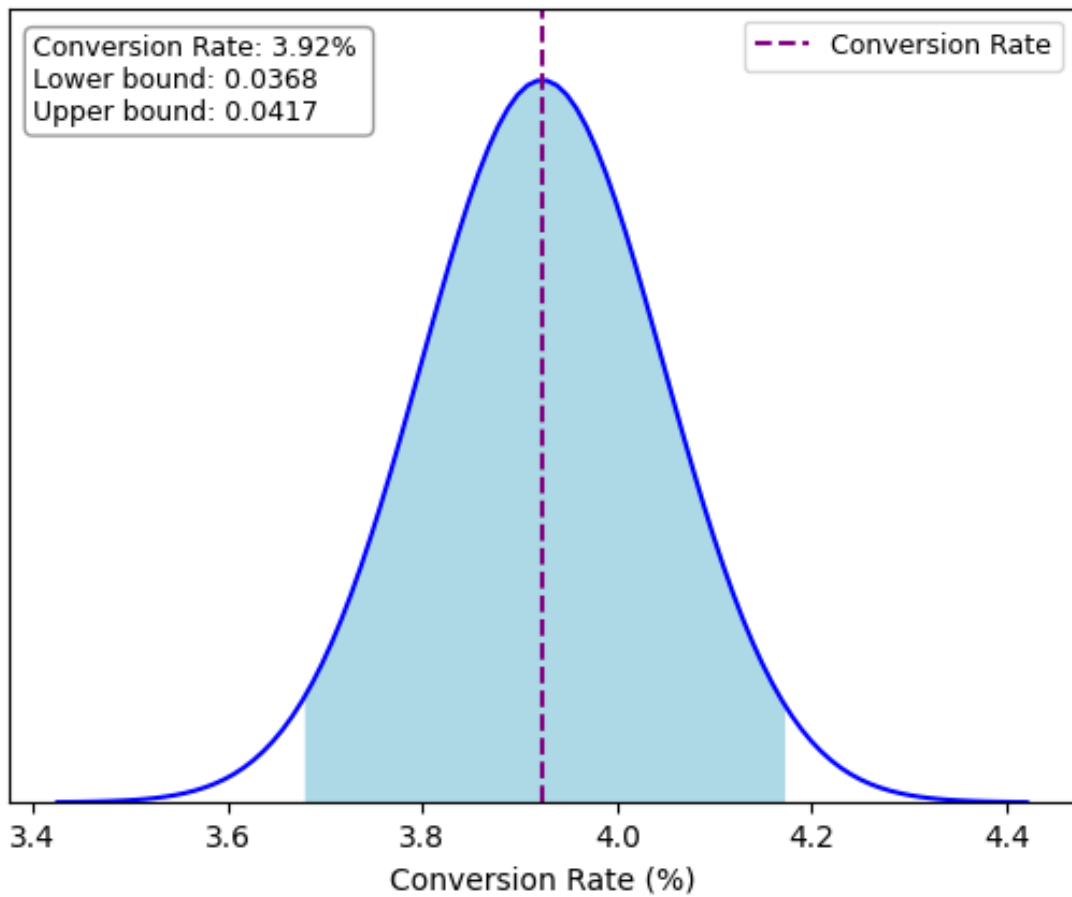
Conversion Rate (%)

Hypothesis- Conversion Rate

p-value: 0.0001
Confidence Interval: [0.0035, 0.0107]

Difference in Conversion Rate