GloBox

A/B Test Results

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Summary

By performing A/B testing, we aimed to identify the most effective version of our home page in terms of increasing revenue.

The results showed the difference in the conversion rate .

The test results did not show much difference in the average amount spent.

Introduction

While GloBox has built its reputation on boutique fashion items and high-end decor products, its food and beverage offerings have seen significant expansion in recent months. The company is now keen on promoting this product category to boost its revenue, aiming to raise awareness among its customer base.

Objectives

• Enhance visibility for the Food & Drink section

• Boost income generation

Context

The Growth team has opted to conduct an A/B test that features prominent products from the food and drink category as a banner positioned at the top of the website. In this test, the control group will not have access to the banner, while the test group will view it as depicted below:

Group A: Control

existing landing page

Group B: Treatment

landing page with food & drink banner

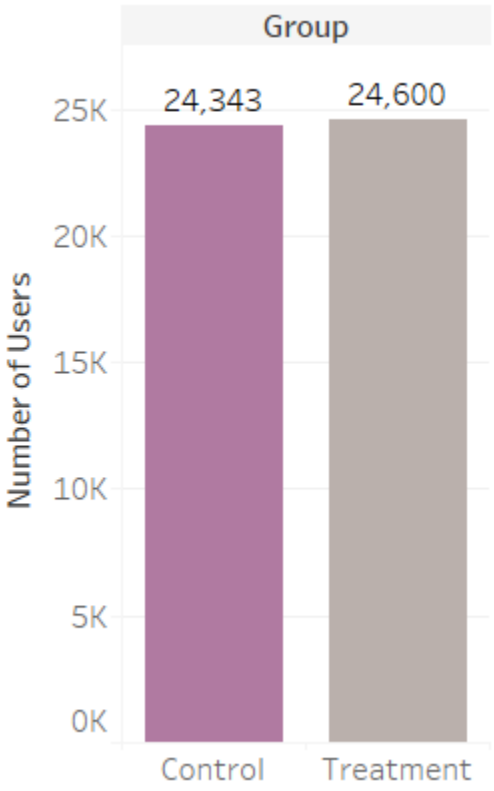
Control - 24,343

Treatment - 24,600

Period of Test (Duration)

The test ran for 13 days from 25th January 2023 to 6th February 2023.

Number of Users



Key Metrics and User Attributes

Key Metrics

1. Conversion Rate
2. Average Amount Spent per User

User Attributes

1. Gender (M = male, F = female, O = other, NA = unknown)
2. Device (I = iOS, A = Android, NA = unknown)
3. Country (ISO 3166 alpha-3 country code, NA = unknown)

Hypothesis Testing

Hypothesis testing was done on the two key metrics - conversion rate and the average amount spent per user. Confidence intervals were also calculated.

Conversion Rate

Null Hypothesis (H_0) - There is no difference in the conversion rates of the two groups.

H_0: $p_B - p_A = p_0$

Alternate Hypothesis (H_1) - There is difference in the conversion rates of the two groups.

H_1: $p_B - p_A \mathrel{!}= p_0$

Where

B = treatment

A=control

$p_0 = 0$

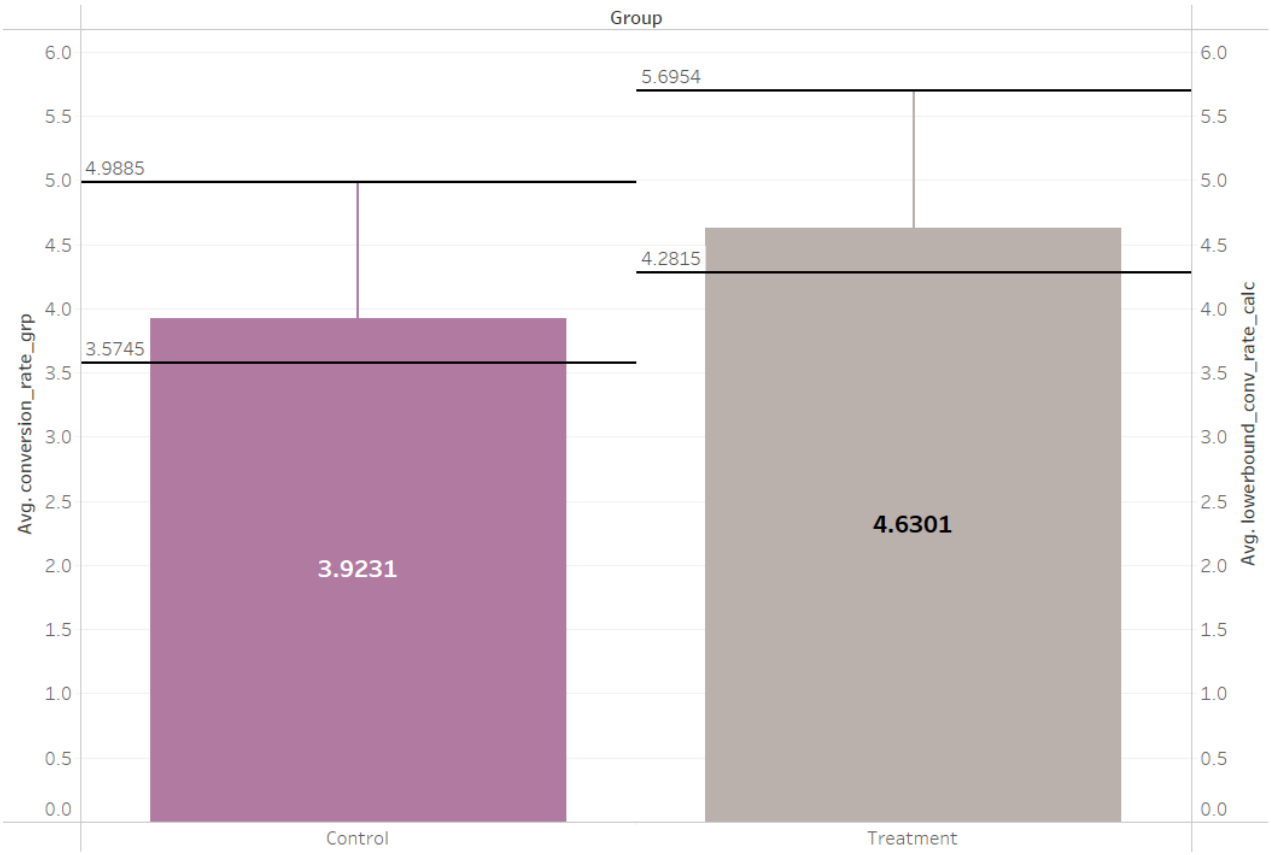
Hypothesis testing was done using a two-sample z-test ($\alpha = 0.05$), normal distribution and pooled proportions.

Result:

p is statistically significant (p = 0.0001), so the null hypothesis is rejected.
There is a difference between the conversion rates of the two groups.

95% Confidence Interval(Conversion rate)

The values were calculated using a two-sample z-test(α = 0.05), normal distribution and unpooled proportions.



The confidence interval for the control group and treatment group has been represented above.

Hypothesis testing for Average Spent

Null hypothesis (H0) - There is no difference in the average amount spent per user of the two groups.

H_0: $\mu_B - \mu_A = \mu_0$

Alternate hypothesis (H1) - There is a difference in the average amount spent per user of the two groups.

H_1: $\mu_B - \mu_A != \mu_0$

Where

B = treatment

A = control

$\mu_0 = 0$

Hypothesis testing was done using a two-sample t-test (α = 0.05), t-distribution and unpooled variances.

Result:

p is not statistically significant (p = 0.9438), so the null hypothesis is not rejected.

There is no difference in the average amount spent by the two groups.

95% Confidence Interval

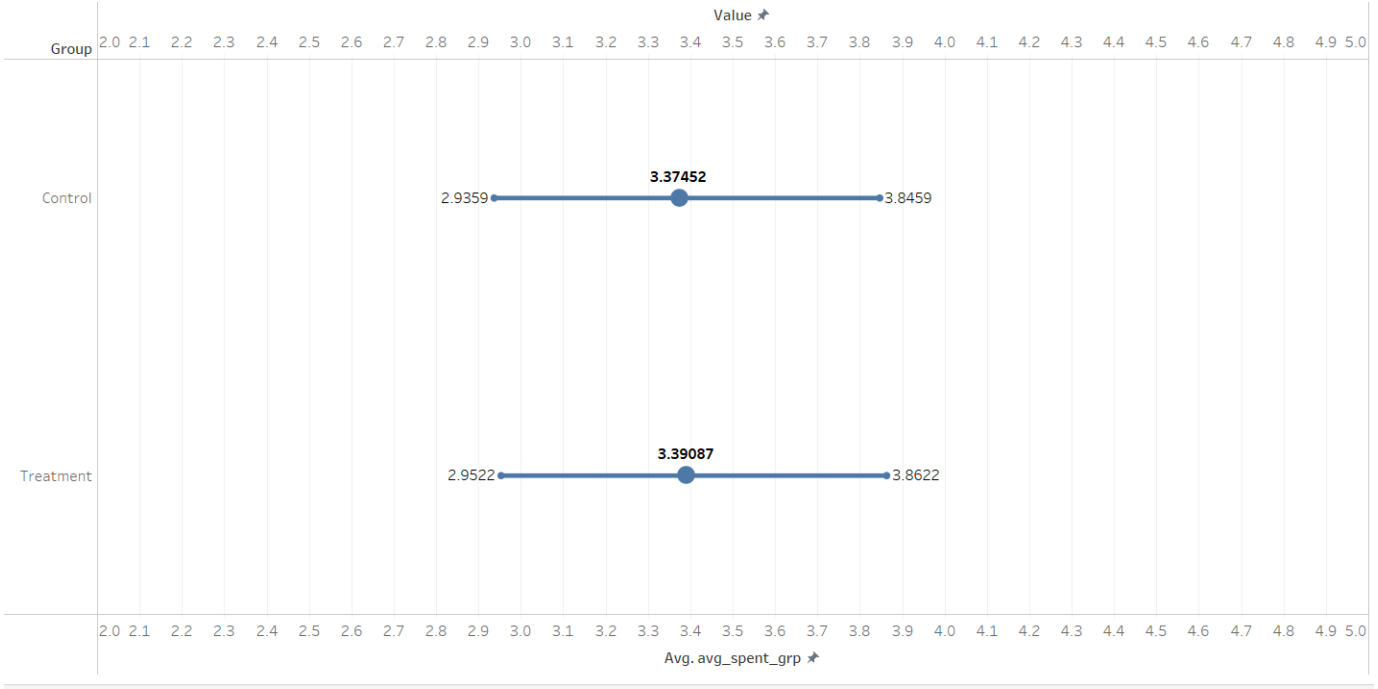
The values were calculated using a two-sample t-test(α = 0.05), t-distribution and unpooled variances.

Lower Bound -0.4387

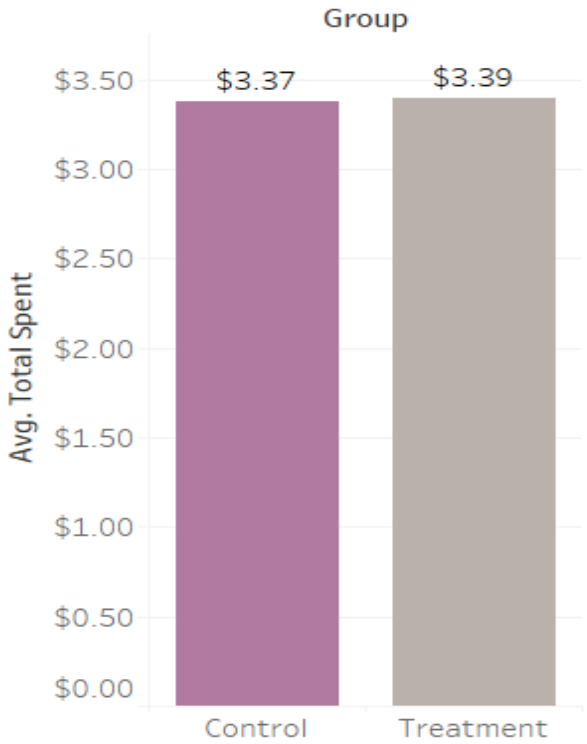
Upper Bound 0.47136

Confidence Interval (-0.4387,0.47136)

Average spent



- Amount Spent not based on category (Food, Drinks)
- No Significant Difference between the revenue for the two groups
- Users Spent averagely between $2- $4 In both groups



Gender Breakdown

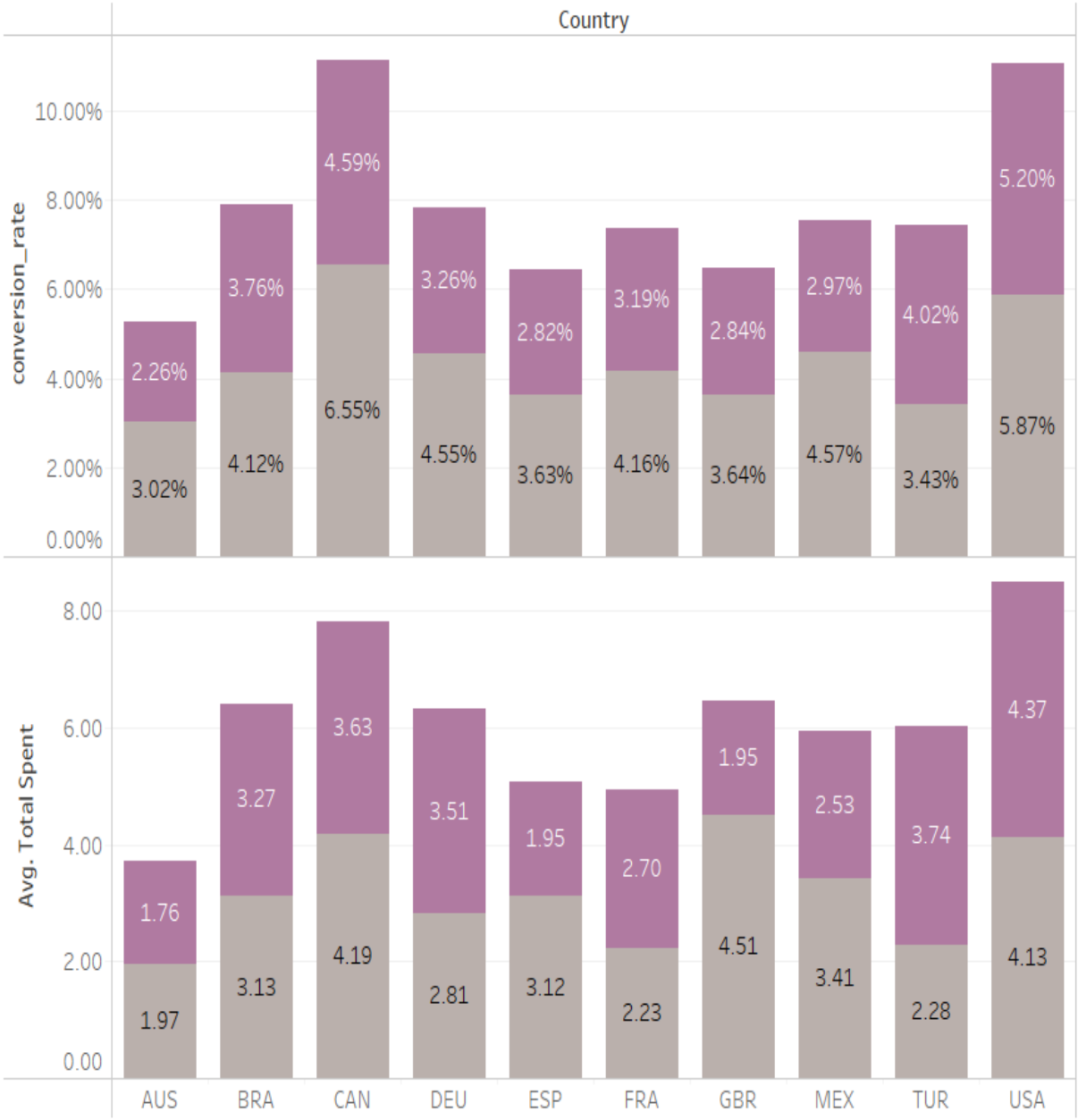
Overall females have a greater conversion rate compared to males.

Looking at it from the group perspective, male users had more conversion variance thus 44% higher than in the control group compared to females which was about 5% increase in conversion.

Device

The analysis did not show much difference in the conversion rate for the groups. Android users have a slightly higher conversion overall with a variance of about 32% increase in conversion for the treatment group.

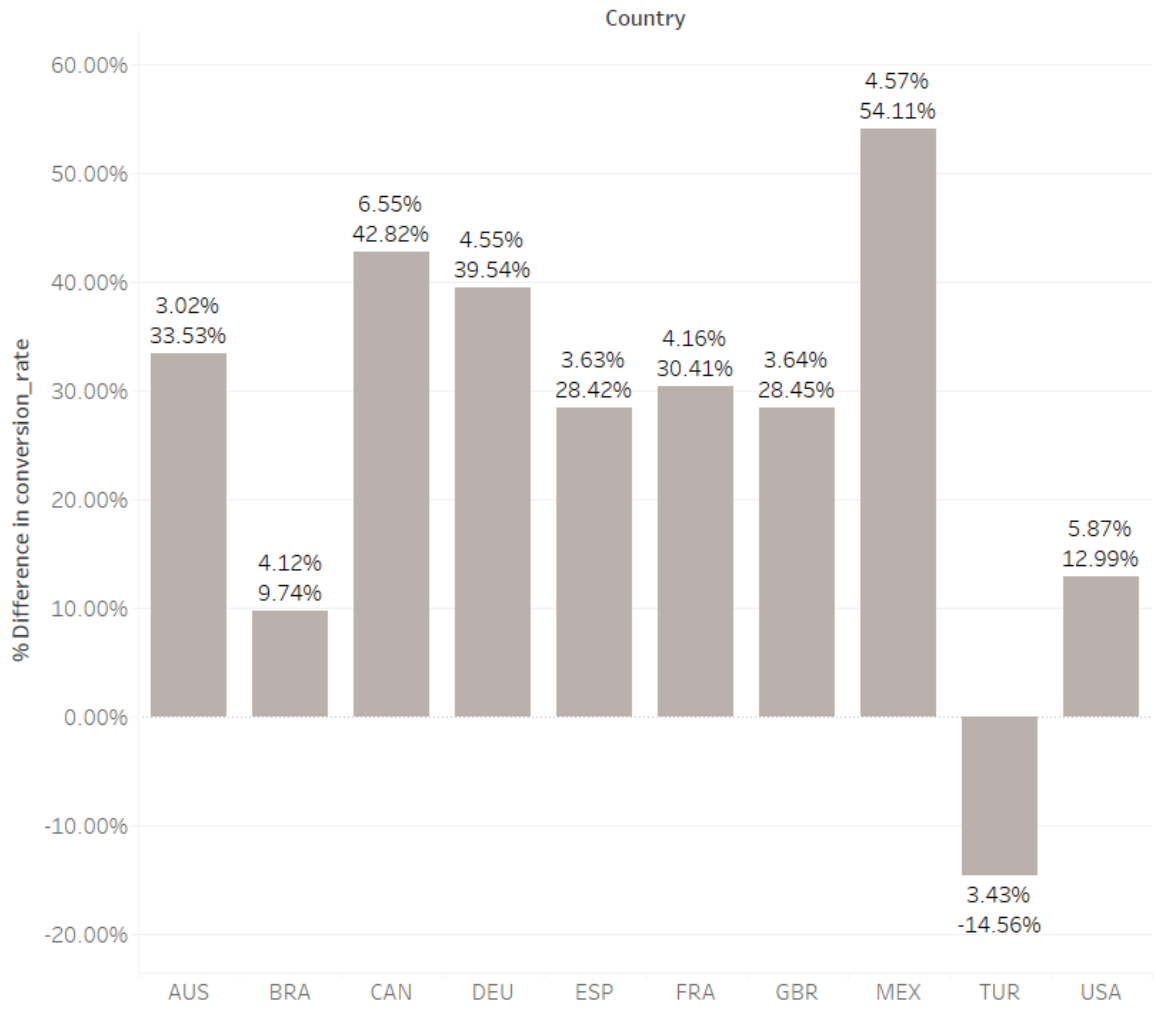
Location Based Analysis



Based on the analysis, there was an **increase in the conversion rate** for all the countries **except Turkey**. Generally, the USA has the highest number of conversions for both groups(Control and Treatment).

The same for the average spent. The new feature seems not to improve our key metrics in **Turkey**.

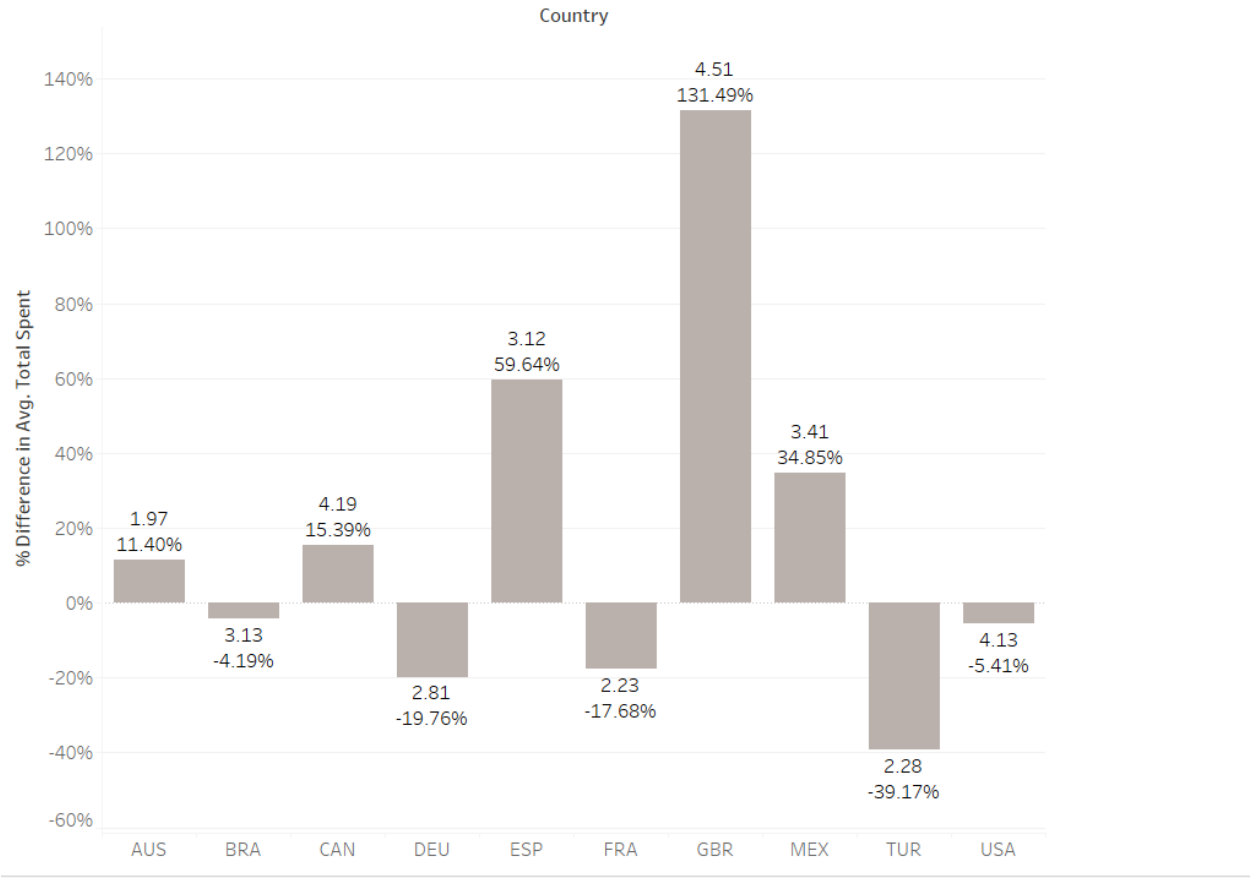
Percentage difference in conversion(Country)



From the graph, even though the **USA has a high conversion(5.87)** the percentage difference in the conversions shows otherwise.
The conversion rate in **Mexico** between the two groups(Control and Treatment) was **about 54% increase** which shows a positive improvement.

There was a drop in the conversion rate in Turkey thus about 15% decrease in conversion rate for the treatment group.

Percentage difference in the average spent



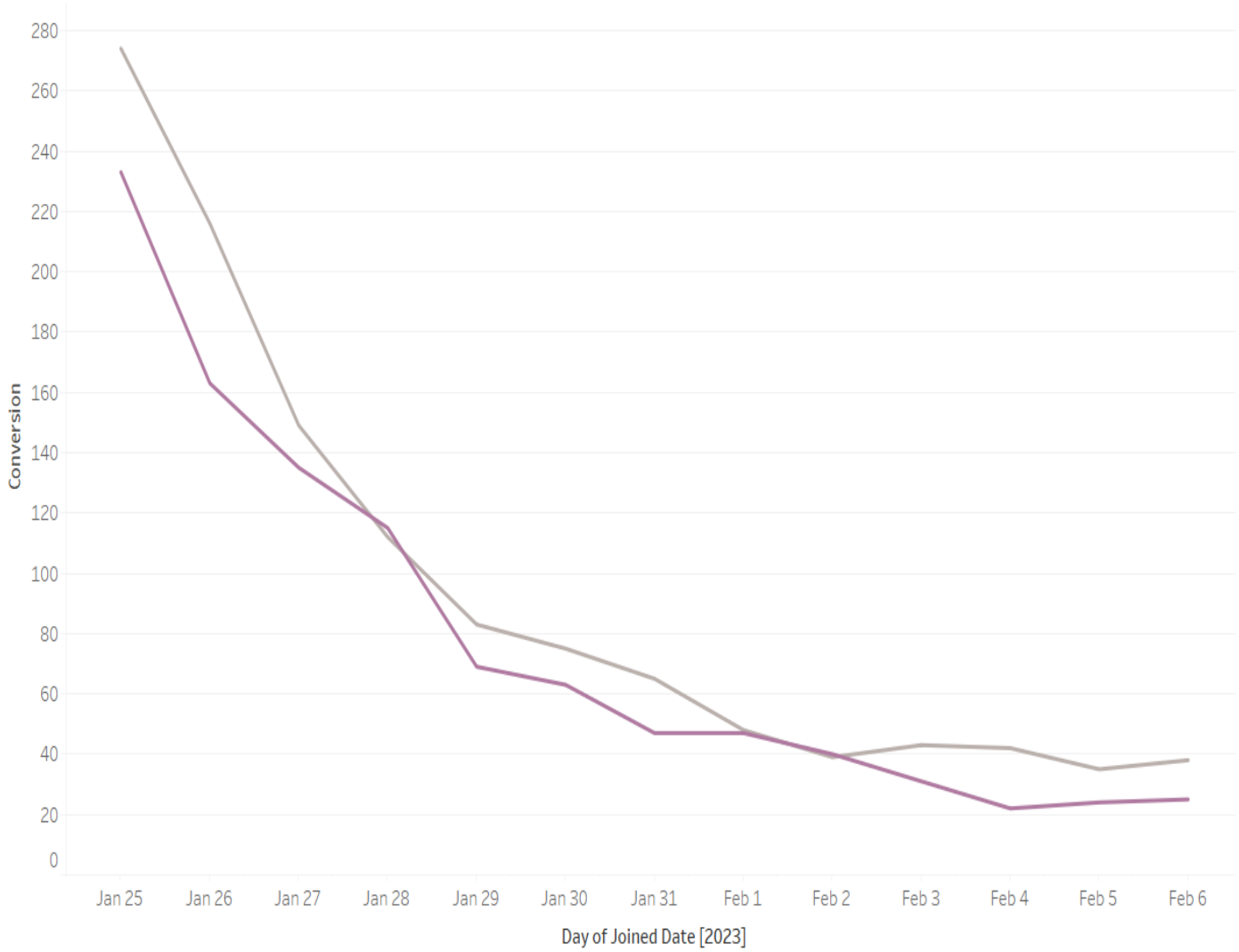
The **UK** had the **highest amount spent** with an increase of about **131%** for the treatment group compared to the control group.
Spain also had about a 50% increase in the amount spent compared to the control group.
However, there are few countries like Brazil, Turkey, France, USA and Germany which had a drop in the amount spent.

Novelty Effect

Conversion over the period

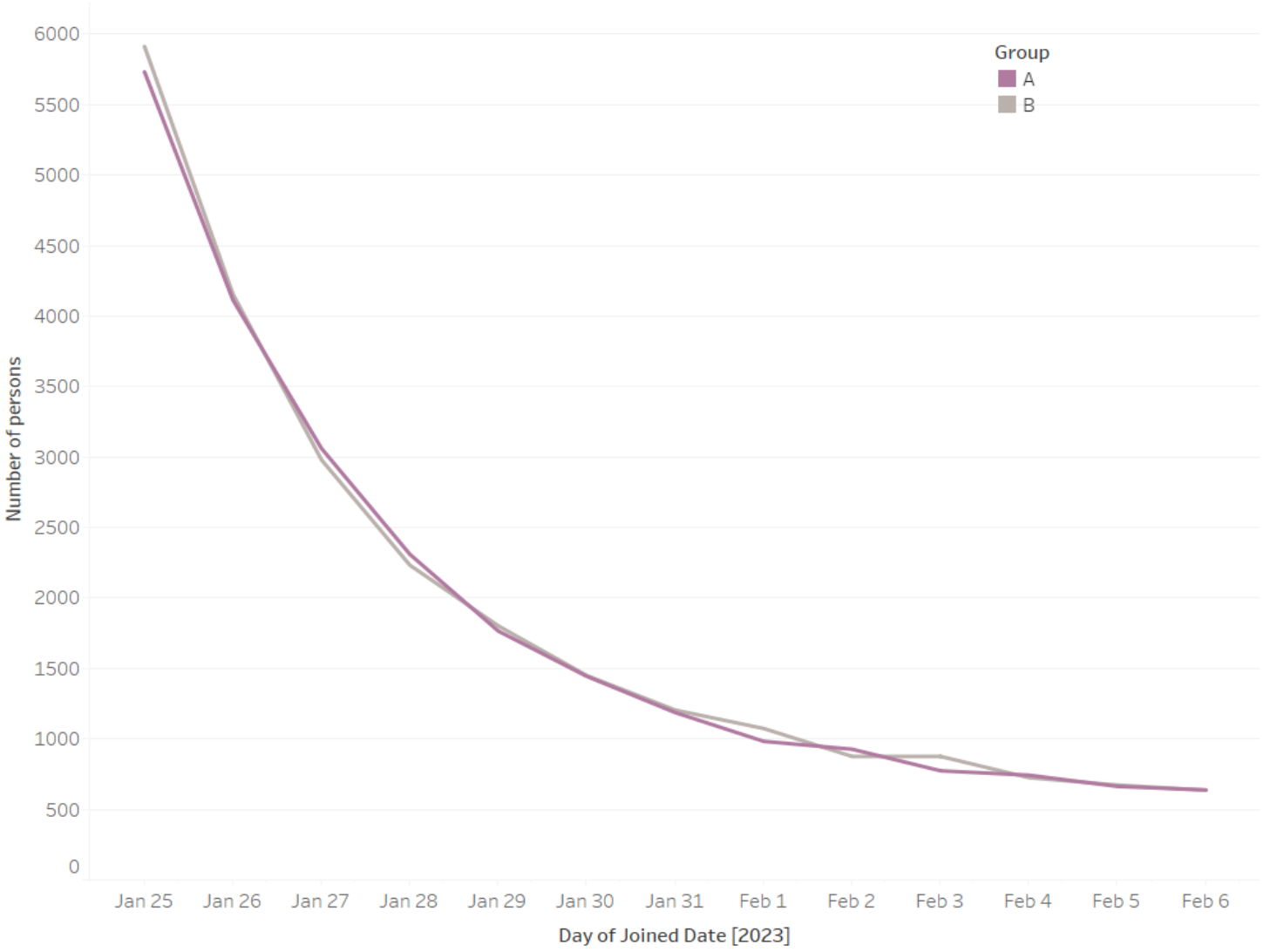
Both groups experienced a steep fall in the overall conversions for the period.

Conversion rate over period based on joined date.



There was a decline in the conversion over the period the number of persons dropped over the period for both groups. Most of the conversions happened within the first 3 days.

Number of persons joined over the period



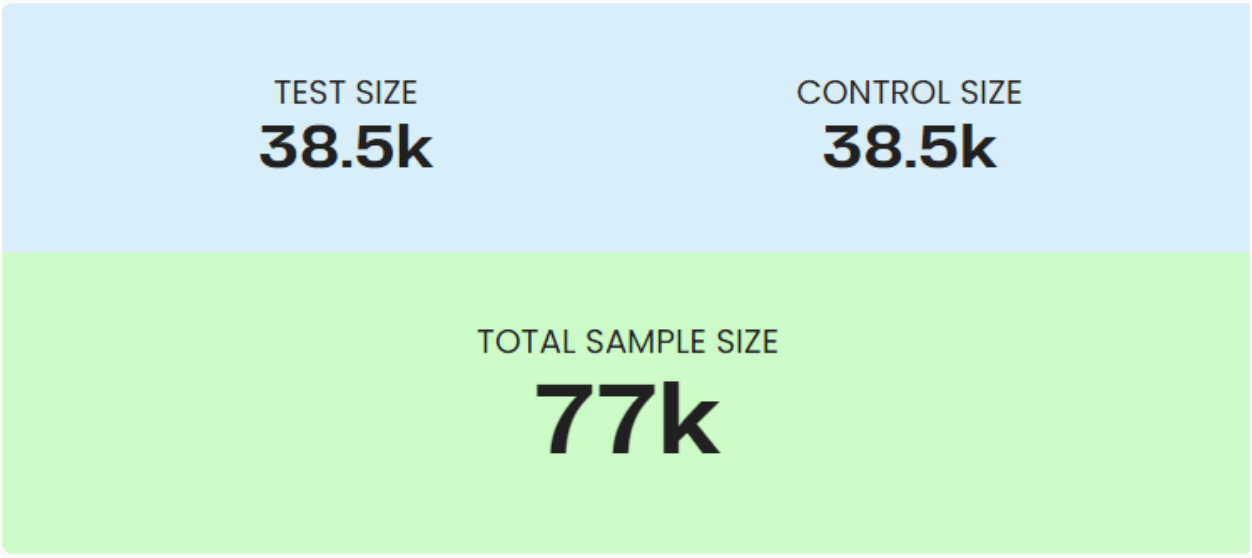
Based on the findings of the joined date,number of persons joined and conversions over the period, we can say there was **no novelty effect**.
The drop affected both groups(control and treatment).
The overall trend shows the relation between the number of persons joining and the conversion.
A drop in the number of persons joining affects the conversion rate.

Power Analysis

Sample Size

Conversion rate

With a split ratio of 0.5,significance of 0.05 and statistical power of 80%, we will need a sample size of 77k taking into consideration 3.92 baseline conversion rate and a minimum detectable effect of 10.



https://www.statsig.com/calculator?mde=10&bcr=3.92&twoSided=true&splitRatio=0.5&alpha=0.05&power=0.8

Average Spent
Assuming a pooled standard deviation of 25.5 units, the study would require a sample size of:

25518671
for each group (i.e. a total sample size of 51037342, assuming equal group sizes), to achieve a power of 80% and a level of significance of 5% (two sided), for detecting a true difference in means between the test and the reference group of 0.020000000000000018 (i.e. 3.39 - 3.37) units.

In other words, if you select a random sample of 25518671 from each population, and determine that the means of the test and the reference groups are 3.39 and 3.37 units, respectively, and the standard deviation is 25.5 units, you would have 80% power to declare that the two groups have significantly different means, i.e. a two sided p-value of less than 0.05.

Recommendation

- Based on the A/B test results, we recommend implementing **test(New variant)** as the default home page design. The slightly higher conversion rate and positive engagement indicate that the new feature resonates well with our users. This change has the potential to drive increased revenue and provide an improved user experience.

- Providing the **category of Spent** in future study data can help in getting a true reflection of the revenue generated on the new feature.

- Increasing the **sample size** can provide a clear understanding of the population.

- Sample Size for the device users can also be looked at as the difference in the number of devices compared to the other can also provide biased results on the device analysis.

- Countries such as the **UK,Mexico and Spain** can be selected in implementing the new feature as they all had an increase in conversions and average spending.

Appendix

SQL Code

DB Connection

URL:postgres://Test:bQNxVzJL4g6u@ep-noisy-flower-846766-pooler.us-east-2.aws.neon.tech/Globox

What is the Start and End dates

```
--The start and end dates
SELECT MIN(dt) as start_date,MAX(dt) as end_date
FROM activity
```

start_date	end_date
2023-01-25	2023-02-06

What is the user conversion rate for the control and treatment groups?

```
SELECT g.group as group_name,
ROUND(CAST(COUNT(distinct activity.uid) AS NUMERIC)/COUNT(g.uid)*100,2) AS conversion_rate
FROM groups AS g
LEFT JOIN activity
ON g.uid=activity.uid
GROUP BY 1
```

group_name	conversion_rate
A	3.91
B	4.62

Extracting data from beeker to tableau for visualization

```
--EXTRACT FIELDS FROM globox database
SELECT
    id,
    CASE WHEN country IS NULL THEN 'UNKNOWN'
    ELSE country END,
    CASE WHEN gender IS NULL THEN 'OTHER'
    ELSE gender END,
    CASE WHEN g.device IS NULL THEN 'UNKNOWN'
    ELSE g.device END,
    g.group,dt,join_dt as joined_date,
    CASE WHEN spent > 0 THEN 1 ELSE 0 END AS conversion,
    --COALESCE FILL THE NULL FIELDS IN SPENT COLUMN
    SUM(COALESCE(spent, 0)) as total_spent
FROM users
LEFT JOIN groups as g ON users.id = g.uid
LEFT JOIN activity ON g.uid = activity.uid
-- GROUPING THE VARIOUS FIELDS
GROUP BY 1,2,3,4,5,6,7,8;
```

id	country	gender	device	group	dt	joined_date	conversion	total_spent
1000038	BRA	M	A	A	(NULL)	2023-01-25	0	0
1000039	GBR	F	A	B	2023-...	2023-02-04	1	36.65
1000040	USA	F	A	A	(NULL)	2023-01-25	0	0
1000041	CAN	M	A	A	(NULL)	2023-01-27	0	0
1000042	BRA	F	I	A	(NULL)	2023-01-25	0	0
1000043	UNKN...	F	A	B	(NULL)	2023-01-25	0	0
1000044	USA	OTHER	A	B	(NULL)	2023-01-27	0	0
1000045	USA	F	I	B	2023-...	2023-01-26	1	51.58
1000046	BRA	M	I	A	(NULL)	2023-01-26	0	0
1000047	USA	F	A	A	(NULL)	2023-01-26	0	0

Tableau Custom Definitions

Custom Fields

Conversion rate

SUM([Conversion])/COUNTD([Id])

Thus sum of conversions over the count of distinct IDs

{ FIXED [Group]:[conversion_rate]} — Conversion rate based on group

Exploratory data analysis

1. Device Analysis

Description of "KPIs(Gender)"

Count of Id, conversion_rate and average of Total Spent for each Device broken down by Group. Color shows details about Device. For pane Conversion_rate: The marks are labeled by conversion_rate. For pane Average of Total Spent: The marks are labeled by average of Total Spent. For pane Count of Id: The marks are labeled by count of Id. The data is filtered on Gender, which keeps F and M. The view is filtered on Exclusions (Device,Group), which keeps 4 members.

Conversion_rate Properties

Marks

The mark type is Bar (Automatic).
The marks are labeled by conversion_rate.
Stacked marks is on.

Shelves

Rows: Count of Id, conversion_rate, Avg. Total Spent
Columns: Group, Device
Filters: Gender, Exclusions (Device,Group)
Text: Conversion_rate

Color: Device

Average of Total Spent Properties

Marks

The mark type is Bar (Automatic).
The marks are labeled by average of Total Spent.
Stacked marks are on.

Shelves

Rows: Count of Id, conversion_rate, Avg. Total Spent
Columns: Group, Device
Filters: Gender, Exclusions (Device,Group)
Text: Average of Total Spent
Color: Device

Count of Id Properties

Marks

The mark type is Bar (Automatic).
The marks are labeled by count of Id.
Stacked marks is on.

Shelves

Rows: Count of Id, conversion_rate, Avg. Total Spent
Columns: Group, Device
Filters: Gender, Exclusions (Device,Group)
Text: Count of Id
Color: Device

Dimensions

Device has 2 members on this sheet
Members: A; I
Gender has 2 members on this sheet
Members: F; M
Group has 2 members on this sheet
Members: A; B

Measures

Average of Total Spent ranges from 2.29 to 5.14 on this sheet.
Count of Id ranges from 7,576 to 12,535 on this sheet.
Conversion_rate ranges from 2.69% to 6.35% on this sheet.
The formula is
SUM([Conversion])/COUNT([Id])

Data Source Details

Data Source: Sheet1 (a_b_testing-2023-10-23_74553)
Type: Hyper
Version: 0
Database:
C:/Users/benja/AppData/Local/Temp/TableauTemp/TEMP_12bwxnu1nhdruw1h5wdlu1mfgwmo.hyper
Table: Extract (Extract.Extract)

2. Gender Analysis

Description of "KPIs(Gender)"

Count of Id, conversion_rate and average of Total Spent for each Device broken down by Group. Color shows details about Device. For pane Conversion_rate: The marks are labeled by conversion_rate. For pane Average of Total Spent: The marks are labeled by average of Total Spent. For pane Count of Id: The marks are labeled by count of Id. The data is filtered on Gender, which keeps F and M. The view is filtered on Exclusions (Device,Group), which keeps 4 members.

Conversion_rate Properties

Marks

The mark type is Bar (Automatic).
The marks are labeled by conversion_rate.
Stacked marks is on.

Shelves

Rows: Count of Id, conversion_rate, Avg. Total Spent
Columns: Group, Device
Filters: Gender, Exclusions (Device,Group)
Text: Conversion_rate
Color: Device

Average of Total Spent Properties

Marks

The mark type is Bar (Automatic).
The marks are labeled by average of Total Spent.
Stacked marks is on.

Shelves

Rows: Count of Id, conversion_rate, Avg. Total Spent
Columns: Group, Device
Filters: Gender, Exclusions (Device,Group)
Text: Average of Total Spent
Color: Device

Count of Id Properties

Marks

The mark type is Bar (Automatic).
The marks are labeled by count of Id.
Stacked marks is on.

Shelves

Rows: Count of Id, conversion_rate, Avg. Total Spent
Columns: Group, Device
Filters: Gender, Exclusions (Device,Group)
Text: Count of Id
Color: Device

Dimensions

Device has 2 members on this sheet
Members: A; I
Gender has 2 members on this sheet
Members: F; M
Group has 2 members on this sheet
Members: A; B

Measures

Average of Total Spent ranges from 2.29 to 5.14 on this sheet.
Count of Id ranges from 7,576 to 12,535 on this sheet.
Conversion_rate ranges from 2.69% to 6.35% on this sheet.
The formula is
SUM([Conversion])/COUNT([Id])

Data Source Details

Data Source: Sheet1 (a_b_testing-2023-10-23_74553)
Type: Hyper
Version: 0
Database:
C:/Users/benja/AppData/Local/Temp/TableauTemp/TEMP_12bwxnu1nhdruw1h5wdlu1mfgwmo.hyper
Table: Extract (Extract.Extract)

3. Difference in Spending Per Country

Description of "% Difference in Average Spent(Country)"

% Difference in Avg. Total Spent for each Country. Color shows details about Group. The marks are labeled by average of Total Spent and % Difference in Avg. Total Spent. The data is filtered on Gender and Device. The Gender filter keeps F, M and OTHER. The Device filter keeps A and I. The view is filtered on Country and % Difference in Avg. Total Spent. The Country filter excludes UNKNOWN. The % Difference in Avg. Total Spent filter keeps non-Null values only.

Marks

The mark type is Bar (Automatic).
The marks are labeled by average of Total Spent and % Difference in Avg. Total Spent.
Stacked marks is on.

Shelves

Rows: % Difference in Avg. Total Spent
Columns: Country
Filters: Gender, Device, Country, % Difference in Avg. Total Spent
Text: Average of Total Spent and % Difference in Avg. Total Spent
Color: Group

Dimensions

Country has 10 members on this sheet
Members: BRA; ESP; GBR; TUR; USA; ...
Device has 2 members on this sheet
Members: A; I
Gender has 3 members on this sheet
Members: F; M; OTHER
Group has 1 members on this sheet
Members: B

Measures

Average of Total Spent ranges from 1.97 to 4.51 on this sheet.
% Difference in Avg. Total Spent ranges from -39.2% to 131.5% on this sheet.
The filter associated with this field keeps non-Null values only.
Calculates the current value as a percentage difference from the previous value. Results are computed along the Group for each Country.

Data Source Details

Data Source: Sheet1 (a_b_testing-2023-10-23_74553)
Type: Hyper
Version: 0
Database: C:/Users/benja/AppData/Local/Temp/TableauTemp/TEMP_12bwxnu1nhdruw1h5wdlu1mfgwmo.hyper
Table: Extract (Extract.Extract)