Bayesian Test

project by:

LINDSAY MCFARLANE

www.lindsaymsba.com

831.601.7684 | lindsay.alexandra14@gmail.com | linkedin: lindsay-mcfarlane

RUE SCOOTER CO.

Summary

Intro

Rue Scooter Co. *is a (hypothetical) french moped company. They are interested in running an* ***A/B test*** *to see if they can* ***improve performance of their Instagram ads***

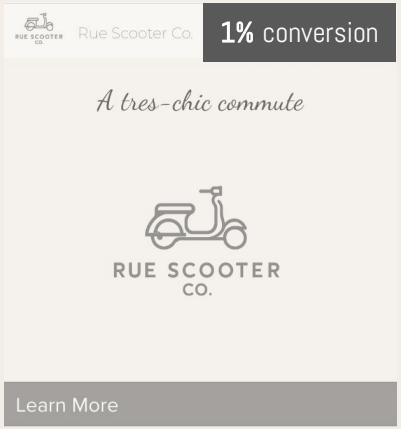
RUE SCOOTER
CO.

Hypothesis

Instagram Ads:

The treatment landing page conversion rate performs better than the control

control



Ad features **just the logo** and tagline and conversion still has **room for improvement based on industry benchmarks (1%-4%)**

treatment

We **hypothesize improvement** with the treatment, as it **shows imagery and gives the user a feel of the product**

Methodology

Statistical Test

Since there is a large sample and two conversion rates to compare, and
I would like it in terms of a probability, I will use a Bayesian Test

$$P(B \text{ better} \mid \text{data}) = \frac{P(\text{data} \mid B \text{ better}) \times P(B \text{ better})}{P(\text{data})}$$

Probability B is better given the data=
Likelihood of observing data if B is better × Prior belief that B is better
÷ Overall probability of observing the test data

Decision criteria

- ✓ **P (prob B > prob A) >=95%**
- ✓ **HDI lower bound >= mde**
- ✓ **HDI width has precision** (width <= 1.6 x mde)

Test Design

Sample Size

The sample size needed is 50,000 users (per group)

Probability Threshold: 95%
Power / Assurance: 80%
Baseline conversion rate: 1%
MDE: 0.2% (20% uplift)
Priors: (1,1)
Sample Needed: 50,000 / group

Results

Test confirms B > A

Conversion Rate A: 1.01%
Conversion Rate B: 1.36%

↓

Uplift (for B):

35%
higher vs. control

Posterior Probability:
P (prob B > prob A) ≈ **1.00**

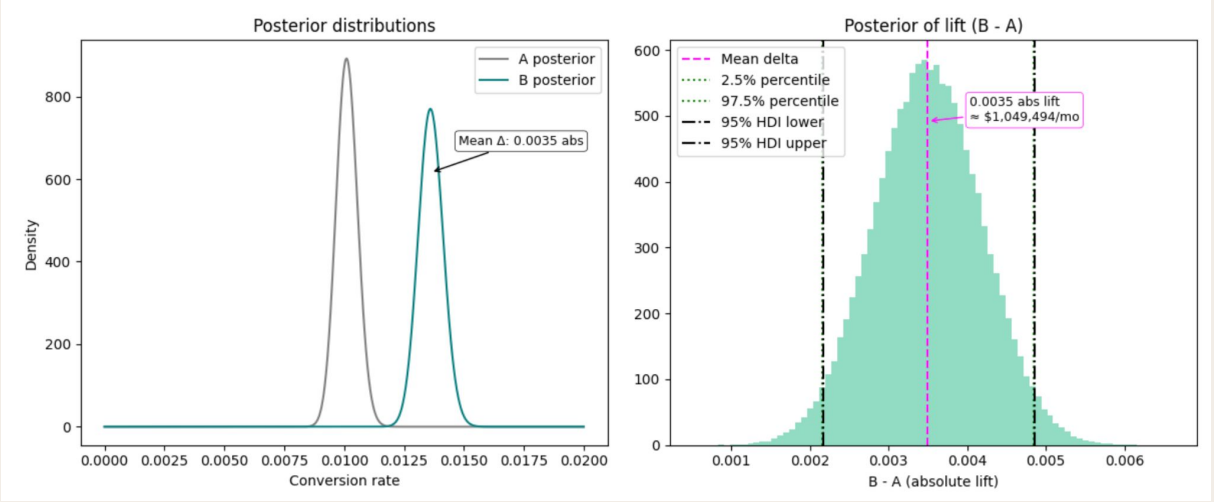
↓

B > A with:

100%
probability*

Results

The mean lift in conversion rate from A to B is 0.35%:



HDI
lower bound > mde of 0.2%

✓

[0.00218, 0.00486]

Predictive power with 5,000 more / group:

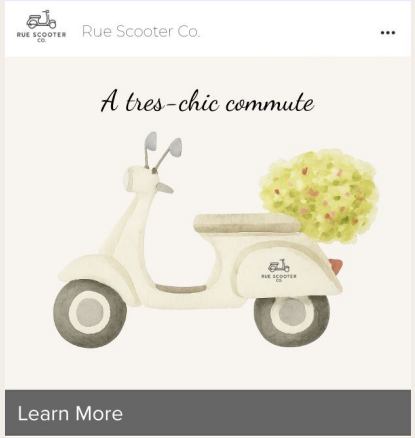
✓

1.000

Recommendation

*The **probability that B > A is greater than 95%***
and the difference between the rates is > the lift we desired (0.2%) with precision,
and the revenue impact is high, therefore:

I recommend implementing the treatment page:



notebook link:

GitHub Pages

Tools: R in Google Colab
Data Source: Self-generated

RUE SCOOTER CO.

Click for Full Deck