

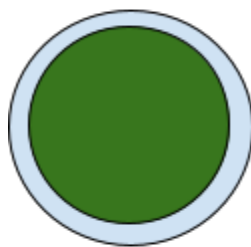
The neighboring cities of Gotham and Metropolis have complementary circadian rhythms: on weekdays, Ultimate Gotham is most active at night, and Ultimate Metropolis is most active during the day. On weekends, there is reasonable activity in both cities. However, a toll bridge, with a two way toll, between the two cities causes driver partners to tend to be exclusive to each city. The Ultimate managers of city operations for the two cities have proposed an experiment to encourage driver partners to be available in both cities, by reimbursing all toll costs.

1) What would you choose as the key measure of success of this experiment in encouraging driver partners to serve both cities, and why would you choose this metric?

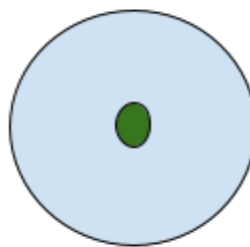
- I would like to measure the average number of rides during the day in Ultimate Gotham and average number of rides during the night in Ultimate Metropolis. If the experiment is working, assuming these averages before the encouragement was something low, then we would see the average number of rides in the unlikely city be significantly higher. Also the prompt says that the tolls tended to cause the drivers to be exclusive to their cities. Which I'm assuming means the avg number of rides during times when each city is least active is going to be much lower than when the cities are active. Visual of success:

Daytime activity **before**
experiment

Metr.

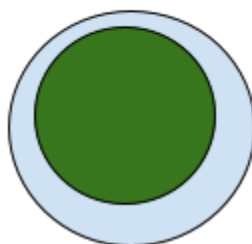


Goth.

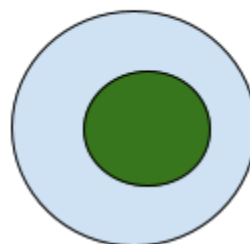


Daytime activity **after**
experiment

Metr.



Goth.



2) Describe a practical experiment you would design to compare the effectiveness of the proposed change in relation to the key measure of success. Please provide details on:

a) how you will implement the experiment

- In this experiment, I would like to collect the time of each ride, the pickup location, the dropoff location, and anything else like ride fare and rider info. The main thing we will focus on is the average number of rides per driver from both cities. At the very least, our alternative Hypothesis is

$$\text{MeanRidesAfter} - \text{MeanRidesBefore} > 0.$$

b) what statistical test(s) you will conduct to verify the significance of the Observation.

- Because we are comparing averages of a population to averages of the same population after some sort of activation, this could be considered a matched pairs design. So we will run a T-test on the before and after means.

c) how you would interpret the results and provide recommendations to the city operations team along with any caveats.

- We could set our alpha level to the usual .05 and reject or fail to reject accordingly. Ideally we would like to see a very low p-value so we could reject our Null which is that there is no statistical difference between MeanRidesAfter and MeanRidesBefore.