

Advertising Experiments at RestaurantGrades

RestaurantGrades (RG) is a restaurant review platform (similar to Yelp or TripAdvisor) with an impressive stock of online reviews written by ordinary restaurant-goers. RG has compelling data demonstrating that these reviews have an economically important influence on the restaurant choices people make, which is exciting for the executive team and has caught a lot of attention within the industry. However, doubts have been raised about the efficacy of their main source of revenue – selling ads to restaurants. To better understand this issue, they have run a randomized controlled trial with a control group and two treatment groups: one treatment to test the impact of their current ads on restaurant sales, and the other treatment to test the impact of an alternative ad design that they are considering switching to. They have given you the attached data, and asked you to help them interpret and act on the results. In particular, they want to understand whether their ads really work, and whether they should stick with their current design or switch to the alternative design.

Background on Advertisements

On RG, each restaurant has a profile page with operational information including its hours, phone number, and location, where RG users who have visited the restaurant can leave reviews for other users. Users can also discover and search for restaurants on the platform using filters, and make reservations and order food through a restaurant's profile page.

The majority of RG's revenues stem from selling ads through its sales team, which cold-calls restaurants to try to convince them to advertise on the platform. Advertisements, labeled as sponsored search results, are placed in a separate section above the organic results for searches that users conduct. Packages of advertisements are purchased for about \$100 per month, and advertisers are required to sign up for a one-year contract. While RG uses a search algorithm much like Google's that determines when and which ads are shown given a user's search for restaurants on the platform, restaurants have little say in what search terms will trigger their ads. However, they are guaranteed that their ads will be shown a minimum of 1,000 times per month to users.

RG's current search algorithm shows ads for restaurants triggered by type of cuisine within a 0.5-mile radius of a user's search. For example, if a user searches for Italian restaurants in Harvard Square, the algorithm will choose two Italian restaurants within Harvard Square to advertise. The engineering team has run a variety of tests looking at how users respond to different types of ads in different

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searches, and designed an alternative search algorithm. Rather than choosing two restaurants by cuisine, the alternative algorithm shows advertisements when a user searches for a specific restaurant and selects two restaurants with similar ratings and hours. While they are reasonably satisfied with how the current algorithm shows ads, they are open to the possibility that the alternative design may be significantly better (or significantly worse) in providing benefit for their advertisers.

Experiment

For the experiment, RG randomly selected 30,000 restaurants that were active on their platform but were not currently advertising, yielding a sample that is representative of their population of restaurants in the US.

For the one-month duration of the experiment, 10,000 restaurants were randomly selected to receive free ads using the current advertising approach, and another 10,000 restaurants were randomly selected to receive the alternatively designed ads. The main difference between these two treatment groups is that the alternative design used a very different algorithm to decide when to deliver ads and which ads to pair with each search, as described above. The rest of the 10,000 restaurants received no advertisements. None of the restaurants were informed about the experiment or the advertisements.

The spreadsheet supplement for this exercise contains a variety of outcomes observed for these 30,000 restaurants during the one month of the experiment.

Spreadsheet Data

The spreadsheet supplement contains data for each restaurant in the experiment observed in the month during the experiment. The unit of observation is a restaurant-month, so data of each restaurant are in a single row. For example, the row *pageviews* means the number of unique visits on restaurant's RG page during that month. The variables included are as follows.

Variables

<i>Variable Name</i>	<i>Definition</i>
treatment	=0: in the control group =1: in the first treatment group (ads of current design) =2: in the second treatment group (ads of alternative design)
pageviews	# of visits to the restaurant's RG page per month
calls	# of phone calls made from the restaurant's mobile RG page per month
reservations	# of reservations made from the restaurant's RG page per month