

Assignment 5

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1.

(a). The experiment I am interested in is called “Visual Memory Experiment”. In this experiment, people are expected to “remember the exact position of a small dot inside a large image”.

(https://worker.mturk.com/requesters/AUYKYIHQXG6XR/projects?ref=w_pl_p_rvw)

(b). The people who participate in the experiment will get \$0.10. Participants can also get up to \$1.50 bonus if they perform well in the experiment.

(c). There are two qualifications: (1) “Location is US” (The Mailing Address the worker provided when creating the Worker Account should be within US) (2) “HIT approval rate (%) is greater than 95.” (More than 95% submissions of HITs were approved). (<https://worker.mturk.com/qualifications/assigned>)

(d). The job takes 60 min. This implies that the hourly rate is \$0.10 per hour. (If we take the bonus into consideration, workers can receive up to \$1.60 per hours if they do very well in the experiment.)

(e). The job will expire in 12/7/2018.

(f). If one million people participated in the task, it will cost the creator at least 100 thousand dollars ($\$0.1 \times 1,000,000 = \$100,000$) to pay the workers. Considering the bonuses the creator would like to provide, the cost can be up to 1.6 million dollars ($(\$0.10 + \$1.5) \times 1,000,000 = \$1,600,000$). Therefore, the money the creator needs to pay will be the highest cost of the project.

2.

The research question of the paper was “How environmental ideology (liberal or conservative) influences people’s response toward energy saving nudges?” (Costa and Kahn, 2013).

To answer the question, the author utilized four data sources. The first data source was “residential billing data” (Costa and Kahn, 2013, pp 685), which included information about the residents’ kilowatt consumption, how long the billing cycle was, and if the residents participated in the program to use renewable sources (Costa and Kahn, 2013). The second data source was the “treatment and control data” (Costa and Kahn, 2013, pp 685), which included

household's basic information, like how large and how old the house was, and what time the residents started to get the HER, etc. (Costa and Kahn, 2013). The third data source was the "individual voter registration and marketing data" (Costa and Kahn, 2013, pp685), which had the information about residents' party affiliation and their donation behavior for environmental groups (Costa and Kahn, 2013). The fourth data set was the "ancillary data" (Costa and Kahn, 2013, pp 686). This data set provided the information about people's attitudes toward the HER (Costa and Kahn, 2013).

The treatment group was the households which received the Home Electricity Reports (HER) and the control group was the households that did not receive HER. The treatment was that the treatment group received HER (Home Energy Report) which told them how much electricity they used monthly and how it compared to their neighbors'. The report also told them some energy saving tips (Costa and Kahn, 2013).

Beyond the previous work of Schultz et al. (2007), in this paper, the author considered people's environmental ideology and how it impacted the treatment effect of the HER. The author defined that the residents whose registration was liberal political party, who lived in place where there were many liberals and who have used renewable resources and donated to environmental organizations were environmentalists/liberals (Costa and Kahn, 2013). Controlling this heterogeneity enabled the author to detect how individual's environmental ideology influences the effects of "nudges".

The result of the paper was that liberals had a higher possibility to reduce electricity consumption after receiving the HERs than conservatives (A conservative reduced the electricity consumption by 1.7% but a liberal decreased by 2.4%. The people who had purchased renewable resources reduced 0.9% more than the people who had not purchase. The households who had donated to environmental causes decreased their use of electricity 1.1% higher than those who had not (Costa and Kahn, 2013)). Liberals also tended to show positive attitudes toward the report than conservatives did (Liberals were 13.1% less likely to say the report was useless and were 10.2% less likely to dislike the report (Costa and Kahn, 2013)).

3. (a)

Firstly, considering the cost, if the fixed cost of a clinic is high, focusing on a small number of clinics might be better because if we use many clinics, we will not have enough money to send text message reminders to patients, which means the number of treatment units will be too small. In contrary, if the fixed cost of a clinic is small, we might spread the clinics widely.

Secondly, if the difference between patients in different clinics is large (i.e. Patients in different clinics react very differently toward message), it might be better to focus on a small number of clinics. In contrary, if the difference between patients in different clinics is small (i.e. Patients in different clinics react similarly toward message), it might be better to spread clinics more widely.

Reason:

According to the formula (4.6) of (Salganik, 2018), If the variance of patients' reaction toward message in control or in the treatment group is higher, the variance of the "average treatment effect" (ATE) will increase (Salganik, 2018). Therefore, if patients in different clinics react very differently toward message, and if we utilize a large number of clinics, we might increase the variance of the average treatment effect in treatment group and control group, which thereby increases the variance of the "average treatment effect". Therefore, in this case, we might need to focus on a small number of clinics.

On the other hand, according to the formula (4.6) of (Salganik, 2018), the variance of the ATE will decrease if the number of (treatment and control) patients increases, so if patients in different clinics react similarly toward message, we will reduce the variance of average treatment effect since we increase the number of participants in the experiment, and the variance of patients' reaction toward message in treatment group and in control group remain about the same. (If we spread the clinics, the number of control units must increase because the variable cost of control units is zero).

(b) According to the formula (4.6) of (Salganik, 2018), the variance of patients' reaction toward message in the control and the treatment group, the covariance of patients' reaction toward message between the treatment and the control group, and the number of participants in the control and the

treatment group can impact the smallest effect size that we will be able to detect.

In detail, if the variance of patients' reaction toward message in the control or in the treatment group is higher, or if the covariance of patients' reaction toward message between the treatment and the control group is higher, or if the number of treatment units and control units is lower, the variance of the ATE will increase, which will reduce our ability to detect the treatment effect. In addition, if the variance of patients' reaction toward message of the treatment group is approximately equal to that of the control group, setting the number of participants in the control group and the treatment group approximately equal will result in the smallest variance (Salganik, 2018), which will strengthen our ability to detect treatment effect (Although in this experiment, since there is no variable cost for control units and there is \$1 variable cost for treatment units (sending the text), we might let the number of patients in the control group higher than the number of the treatment units because this will increase the number of total participants).

References

https://worker.mturk.com/requesters/AUYKYIHQXG6XR/projects?ref=w_pl_prvw

<https://worker.mturk.com/qualifications/assigned>

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