

1.

- a) The experiment interests me most is called ‘Investment experiment’ by Fynn Gerken.
- b) The payment structure of this experiment consists of two part. The first part is a \$0.50 flat rate. The second part is bonus, which means that you could get an additional \$0.25 per correct answer. Considering that there are three questions in this experiment, the highest amount you could get in this experiment is \$1.25. The detailed structure is shown below:

Correct answers:	Total amount you get:
0	\$0.5
1	\$0.75
2	\$1
3	\$1.25

- c) There are 4 qualifications required in this experiment. Firstly, your location is US. Secondly, your HIT approval rate (%) is greater than 95. Thirdly, your previous participation has not been granted. Fourthly, your investment Experience is 100, which means that you are 18 years old or older; you have previously bought or sold an individual company’s common stock or debt securities; you have, at least once, evaluated a company’s performance by analyzing its financial statements.
- d) The experiment creator supposed that it will cost you 10 minutes to

take this experiment. Considering that the amount you get will be determined by your performance (to be specific, the number of correct answers), therefore, the implied hourly rates will be determined by the number of correct answers as well. Below is a table shows the structure of implied hourly rates.

Correct answers:	Implied hourly rate:
0	\$3.0/hour
1	\$4.5/hour
2	\$6.0/hour
3	\$7.5/hour

- e) This experiment will expire on 12/02/2018, 11:58AM.(After 21 days from 11/11/2018)
- f) Considering that the most amount you could get from this experiment is \$1.25, therefore, the maximization of this project would cost the HIT experiment creator if 1 million people participated in the task is 1.25 million dollars.

2.

In this paper, authors try to convey their research question that ‘what’s the role of ideology in energy conservation ‘nudges’ with peer information?’¹ They use three datasets to solve their question. ‘The primary data set consists of residential billing data from January 2007 to October 2009.’ These data comes from the electric utility company and provide them with information on the amount of the electricity, the length of the billing cycle and the type of the resource from which electricity is generated. Then, they merge their data to the dataset of individual voter registration and marketing data for March 2009, which they purchased from www.aristotle.com. From this dataset, authors get the information of some people’s party affiliation and whether they donate to environmental organizations. What’s more, they also used an ancillary data set, which used to examine household attitudes about the Home Energy Report by ideology.² Using these three datasets, authors built a merged dataset with everything they need for their model, which are energy consumption information, political preference information, and treatment information (HER).

In their experiment, the treatment group is those who have received the

¹ Costa, Dora L. and Matthew E. Kahn, “Energy Conservation Nudges and Environmentalist Ideology: evidence from a Randomized Residential Electricity Field Experiment,” Journal of the European Economic Association, June 2013, 11 (3), P681, 1.Introduction

² Same paper, P685-686,4.Data

HER, among which ‘24,028 received a monthly report and 9,636 received a quarterly report.’ The control group is those who have never received such reports and there are 48,058 households in the control group. Both of them are randomly chosen from census blocks.³ The treatment of this experiment is to receive the HER.

Compared with the Schultz et al. (2007)’s paper which tried to control the heterogeneity only by the ‘above or below the average of the energy consumption’⁴, Costa and Kahn definitely went further that they introduce more control variables in different aspects. For example, for the house and nature characteristics, they introduce a cubic in mean daily (24 hr.) temperature, the cubic in daily temperature interacted with a dummy indicating whether the home is an electric home, household fixed effects, year-month fixed effects, and interactions between characteristics and a time dummy indicating the experiment has started. What’s more, their model also includes the party preference, green indicator and block characteristics and so on.

In conclusion, their paper finds that ‘environmental nudges are most effective in relatively liberal communities.’ Households with liberal

³ Same paper, P685–686, 4. Data

⁴ Schultz, P. Wesley, Jessica M. Nolan, Robert B. Cialdini, Noah J. Goldstein and, and Vidas Griskevicius, “The Constructive, Destructive, and Reconstructive Power of Social Norms,” *Psychological Science*, 2007, 18 (5), P430

preference are less likely to drop out of the experiment and more likely to report that they like receiving the report than political conservatives. What's more, they are more willing to make efforts on reduce their electricity consumption by a larger percentage than conservatives.⁵

Reference

Costa, Dora L. and Matthew E. Kahn, "Energy Conservation Nudges and Environmentalist Ideology: Evidence from a Randomized Residential Electricity Field Experiment," *Journal of the European Economic Association*, June 2013, 11 (3), 680-702.

Schultz, P. Wesley, Jessica M. Nolan, Robert B. Cialdini, Noah J. Goldsteinand, and Vidas Griskevicius, "The Constructive, Destructive, and Reconstructive Power of Social Norms," *Psychological Science*, 2007, 18 (5), 429-434.

⁵ Same Paper, P698, Conclusion.

3.

- a) To answer this question, we must first judge whether ‘the only relevant treatment is the one that we delivers. In other words, is there anything other than the treatment that causes people in the treatment and control conditions to be treated differently?’¹ In this experiment, we should first judge the similarity between these 150 clinics. For example, some of these clinics might be normal clinic like the minute clinic in CVS, while some of them might be upmarket clinic, which only treat high-income patients. Let us suppose that high-income people’s schedules are usually busier; there is a higher tendency for them to miss their vaccination due to different reasons, like emergency meeting or unexpected business trip. In this context, different patients in different clinics cannot represent each other and it might be better for us to spread our money to a wider range to include different types of clinics. What’s more, we need to be very cautious in this judgement, even all of these clinics are minute clinic, the one that is in a rich neighborhood could be different from the one that is in a rather low-income neighborhood.

In addition, some clinics might be polyclinic in which different members might reach out each other easily. For example, if a family of

¹ Salganik, Matthew J., *Bit by Bit: Social Research in the Digital Age*, Princeton University Press, 2018. Chapter 4, Mathematical notes, Potential Outcomes Framework.

four people chooses to get vaccination in the same day and only the father is in the treatment condition. However, the father could easily remind other family member after receive that message and their performances are being influenced as well. Then, it violates our assumption that a person's performance will not be impacted by the treatment for other people. Therefore, we may also need to include more clinics in our research to deal with this problem.

However, if we could reach a conclusion that all these clinics are quite the same and there are no hidden treatments, it is better for us to focus our resource on a smaller number of clinics. According to the problem, maybe we could just do our research in two clinics and text to 300 patients randomly in each clinic to make sure that the number of participants in the treatment condition and the control condition are the same and the sample of treatment group is large enough. Therefore, our estimation is more precise.²

b) From my perspective, the design of the experiment will determine the smallest effect size and it could be subdivided into two major factors.

² Same book, Chapter 4, Mathematical notes, Precision.

The first one is the relative size of the treatment group and control group. From the formula given in the ‘Precision’ part of this book, we could conclude that the optimal allocation of participants in treatment group and control group is to make sure that the number of them is the same. Therefore, their behavior could be estimated as accurately as it could have been.³ In our experiment, it means that it might be better to focus our resource on a smaller number of clinics and tries to make the number of people who receive the text message equals to those who do not receive the reminder. In addition, considering that there is a fixed cost in each clinic, a smaller number of clinics also mean that we could allocate more money on treatment group and get a larger sample, which improve the estimation’s precision and make the smallest effect size smaller. The second one is the selection of the estimator. ‘It is hard to detect a relative small effect in noisy outcome data.’ However, if we could differentiate out this naturally occurring variability, then there is much less variability and that makes it easier to detect a small effect.⁴ Therefore, if we choose to use the difference-of-difference estimator rather than difference-of-means estimator, the smallest effect size might be smaller.

³ Same book, Chapter 4, Mathematical notes, Precision.

⁴ Same book, Chapter 4, Mathematical notes, Precision.

Reference

Salganik, Matthew J., Bit by Bit: Social Research in the Digital Age,
Princeton University Press, 2018.