Nudging Recycling with a Mobile Game:[1]

Benjamin Ho and Suchen Zhu [2]

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Introduction

At Vassar's campus, as much as half of our recycling bags are discarded due to contamination (e.g. half empty soda bottles, or wrappers contaminated by food waste). Our office of sustainability has worked on an on-going campaign to better educate Vassar students on how to recycle, but signs and orientation events seem to have limited effectiveness. Can we do better with an App.

We developed a game (runs in a browser, or on phone) that teaches players to properly recycle. Subjects are randomized into 4 treatments that changes the scoring rules of the game (gaining points vs losing points, and solo scores vs cooperative scores) and a control where they do the survey before playing the game.

The survey obtains informed consent and will then measure how the game affects both their knowledge of recycling rules and their pro-social preferences by giving them a chance to win a $20 gift card, and the opportunity to donate part of their winnings to a curated selection of charities. Email will be optionally collected only to be able to send the winner a gift card and will otherwise be discarded. No other identifying information will be collected.

Subjects will be recruited through Amazon mTurk, online reddit forums, and during Vassar's freshman orientation event. Since we intend to use the game during orientation, the game may be played be participants who may be under the age of 18 and may be undocumented.

Game distributed by web link either via Amazon mturk or directly to students during freshman orientation.

When students get the link to the game, they are automatically randomized into one of the five treatments, that only affects how the scoring but does not impact game play itself. No data is recorded at this stage, this also helps get past App Store approvals.

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[2] Vassar College. Contact email: beho@vassar.edu

After reaching 20 points within the game, a survey link is available from the main menu. We also tell them the survey is for research purposes and they have the chance to win a gift card. We can also tell them here (must be 18 to participate). They are also given a 4 digit code that encodes their score, and playtime, and treatment group.

The survey takes them to a google form, where we obtain informed consent, and ask to make sure they are 18. If they are under 18 we can end the survey here.

Otherwise, we ask them for their code, then we ask them questions on whether they would want to donate the gift card if they win the gift card, and questions about how well they learned the recycling rules.

An (optional) email is collected for the purpose of distributing the gift card but will not be used in any other way and will not be associated with the dataset except to distribute the gift card code.

Research Strategy

Sampling

Sampling Frame
- Workers on Amazon mTurk restricted to living in the US who meet minimum reputation score cutoffs.

- 350 people given power calculations.

Statistical Power
- Using alpha of .05 and a power of 0.80, and based on a pilot test, the mean donation was $6 with standard deviation of 3. We would need a sample size of 280 to detect a $1 increase in donations. Thus our main treatments have approximately 280, with 70 for a baseline control that received no treatments.

Assignment to Treatment
- The game automatically randomly assigns all players to one of the five treatment groups.

Attrition from the Sample
- Based on the pilot, we did get around 60% attrition, however we have no reason to believe there would be differential attrition by treatment group, and saw no evidence for it.

- Also we don't expect attrition to be significantly correlated with our variables of interest.

- We did our best to minimize attrition by making both the game and the survey as short and painless as possible.

Fieldwork

Instruments
– We have a manipulation check that assesses emotional state, survey questions that test knowledge about recycling, and donation decisions to environmental and non-environmental charities.

Data Collection
– The task will be posted on Amazon mTurk. Based on the pilot, we expect data collection to take less than 24 hours. Each subject takes approximately 10-15 minutes to complete the game and the online google survey.

Data Processing
– Data will be analyzed using Stata

Empirical Analysis

Variables
– The main outcome variables are donations to environmental vs non environmental charities and

Balancing Checks
– We will check all demographic variables for balance across treatment groups, using paired t-tests, with a Buonferroni correction, but also using the procedure suggested by List et al, 2019.

Treatment Effects

Intent to Treat
– We will estimate the causal effect of our randomization on the outcome variables.

Treatment on the Treated
– However, we will also consider an IV estimate based on our manipulation checks.

– In both cases, we will include demographic and game play controls?

Heterogeneous Effects
– We will consider heterogeneity by demographic variables and game skill. We expect familiarity with gaming to alter the utility/cost of game play.

– We will run all of our main specifications with sub-samples and also interaction terms for the above sub-groups.

Research Team

–   Principal investigators are Ben Ho and Suchen Zhu

Calendar

- Data collection will begin in October 2021. Analysis will continue until 2022.