Preference Aligned Messaging for Conservation

Pre-Analysis Plan

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Background Objectives

This project aims to understand whether preference aligned messaging can prompt engagement and conservation-oriented behavior from consumers who are otherwise less motivated to conserve. Our partnering water utility is introducing a new product (leak alerts), which has multiple types of functions: (1) some that are aligned with the social objective of the water utility (e.g., water conservation) and (2) some that are aligned with personal objectives (e.g., avoiding property damage or saving money). In a field experiment conducted over email and postcards, we vary messaging about this product (which is available to all households in the water utility's service area) to manipulate consumers' beliefs about the primary function of the product. We expect that there are disadvantages to trying to appeal to diverse groups with common messaging, especially in the context of politically polarizing topics like conservation. We, thus, hypothesize that non-socially oriented messaging can help previously reluctant groups engage with information about socially-aligned change. This engagement can potentially lead to conservation-oriented actions and, ultimately, conservation. To test this set of hypotheses, we measure the effect of different messages on three sets of outcomes: (1) outcomes indicating likely exposure to information and engagement with the water utility, (2) outcomes related to conservation actions taken and (3) water usage outcomes. We are particularly interested in heterogeneity in responses based on households' characteristics as well as past engagement and conservation activities.

Treatment: *Emails campaign with shared topics but unique themes. Themes: Save Water, Save Money, and Protect Property*

Moulton Niguel Water District (MNWD) is rolling out a district wide marketing campaign to increase customer engagement with their new "leak alerts" system that their new AMI water meters provide. As part of the marketing campaign design, we created three campaign themes to evaluate whether "preference aligned'' messaging aimed at appealing to different consumer motivations impacts engagement and, ultimately, conservation behaviors of heterogeneous

consumers. Each of the three message types informs consumers of their auto-enrollment in leak alerts and varies the reason for why leak alerts can be helpful to the household or the broader society. Depending on the household's treatment assignment, the household will receive messages advocating that leak alerts provide water savings (societal benefit), monetary savings (individual benefit), or protection from home damage (individual benefit).

MNWD uses email campaigns to encourage engagement and action from their customers to meet institutional water reduction goals. The typical marketing campaigns focused on conservation-themed messaging. This experiment varies the messaging to explore whether simple changes to marketing messages can increase household engagement with the utility and lead to increased uptake of conservation-oriented behaviors. We are particularly interested in reaching consumers who have not previously engaged in conservation-oriented behaviors and those who engage in conservation, but are likely to back-slide when the need to conserve appears to be less pressing.

The three themes (Save Water, Save Money, and Protect Property) are each designed to appeal to different parts of consumer utility.

- *Save Water* is the traditional messaging campaign that appeals to consumers' disutility cost of consuming water beyond the price paid. This message is geared towards a social rather than individual objective.
- *Save Money* frames the benefit of leak detection and costs of residential leaks in monetary terms. Here customers are primed to think about monetary loss and savings; i.e., an individual objective.
- *Protect Property* frames the benefit of leak detection and costs of residential leaks in terms of personal inconvenience and property loss without using monetary information. This theme uses language about personal grief caused by leaks in the home ; i.e., individual objective.

Study Design

Sample Selection

Our sample is all MNWD customers who are enrolled in their customer portals and have a new AMI water meter that allows leak detection.

Randomization

We randomize all customers emails into one of the three email campaign themes. We stratify to accommodate some systematic customer differences and to reduce statistical power by using related pre-treatment outcomes.

We first split the sample into two groups:

- Group 1: Customers who have accounts linked to an email address with >1 accounts [422 **accounts, ~2%]**

We cannot identify in our data who is the primary resident and recipient that our messaging campaign would be influencing. To ensure consistent messaging in this group we assign all billing account ids linked with a given email address to the same treatment group. Here we randomize email addresses into the three email campaigns with equal probability.

- Group 2: customers who have one email [**19094 accounts]** for their account.

  Within this group we further stratify the email address into one of eight (2^3) strata based on the following criteria:
  1. Has the customer used their customer portal from 2021-01 to 2022-06?
  2. (Starting from earliest leak data [2022-02-06 20:00:00] Has your Account had a Leak Detected?
  3. Have you been over water budget from 2021-01 to 2022-05?
  4. If an account does not appear in the event data or monthly billing data, they are assigned 0 values for 1-3 and assigned to the block where all values are 0.

Sample Split	Save Money	Save Water (Control)	Protect Property
Group 1	148	130	144
Group 2	6363	6366	6365

Group 2 Blocks

Logged Into Portal	Over Water Budget	Leak Detected	Randomization Block	Number of Accounts
0	0	0	1	2312
0	0	1	3	155
0	1	0	2	2734
0	1	1	4	588
1	0	0	5	5225
1	0	1	7	307
1	1	0	6	6556
1	1	1	8	1639
				Total 19516

Block	Save money	Save water	Protect property
1	767	767	767
2	906	906	906
3	51	51	51

4	192	192	191
5	1662	1663	1663
6	2149	2150	2150
7	100	101	101
8	536	536	536
Number Of Accounts By Date (Wave 1)			
Treatment	12-jul	13-jul	14-jul
Save money	2164	2164	2165
Save water	2175	2174	2174
Protect property	2167	2166	2167
Number Of Accounts By Date (Wave 2)			
Treatment	26-jul	27-jul	28-jul
Save money	2164	2165	2164
Save water	2175	2174	2174
Protect property	2166	2167	2167

Analysis Plan Design

Overview of Outcomes

	Engagement/ Information	Actions	Conservation Outcome
General	I.a.iii: unsubscribe rates I.b.i: portal logins	Unobserved	III.c.i: change in water usage due to general engagement
Leak Alerts	I.a.i&ii: open and click rates I.b.ii-v: visits to relevant websites, unenroll in leak alerts, setting updates & # leak alerts received I.c: calls or other utility engagement	II.a.i-iv: # of leaks detected and resolved, time to resolution	III.a: water usage up or down (in presence of leak or not) III.b: change in water usage due to leak alerts III.c.ii: change in water usage due to other engagement with leak alerts
Other Observed (rebates, water audits, etc.)	Unobserved	II.b: file for rebate, schedule audit, etc.	III.d: change in water usage due to other conservation actions (unlikely to have power to measure this)

Outcomes of Interest

I. Customer engagement with the message and utility: This allows us to test our primary hypothesis, and we expect to see the strongest impact of messaging on this set of outcomes (starting with the strongest hypothesized effect at the top and ending with the weakest effect).

   a. Message engagement
      i. Email open rates

ii. Email click-through rates
iii. Unsubscribe rates

b. Website and portal engagement
    i. Portal log-in (time to first log-in after message, log-in frequency in the months that follow, etc.)
    ii. Visits to leak-related MNWD websites (e.g., info about adding leak alert recipients)
    iii. Un-enrollement from leak alerts
    iv. Updates to leak alert settings
    v. Leak alerts received

c. Water utility engagement
    i. Calls or other form of engagement with utility (if available)

II. Customer engagement with conservation activities: Conservation activity outcomes are a step removed from the message engagement. Thus, we expect to see weaker effects of messaging on this set of results compared to the direct engagement measures in I.

a. Leaks: Of the conservation activity outcomes in II, we expect there to be strongest effect of messaging on activities related to leak monitoring, resolution, etc.
    i. Number of leaks detected (are people more proactive in monitoring?)
    ii. Number of leaks resolved (are people better at resolving)
    iii. Length of leaks / time to resolution (are people quicker to take care of leak)
    iv. Severity of leak (this requires linking leak data with water usage AMI data)

b. Other conservation activities (all for which we have data from MNWD): While we hypothesize that we are unlikely to see a spillover effect of messaging on other conservation activities, we plan to analyze these outcomes as well.
    i. Does the messaging and subsequent engagement induce consumers to explore and engage in other conservation alternatives?

III. Water Consumption: Water consumption outcomes are a step removed from the message engagement. Thus, we expect to see weaker effects of messaging on this set of results compared to the direct engagement measures in I.

In this analysis, we focus on ITT effects of messaging on water consumption (sub-bullet (a)). There may also be LATE effects of interest that focus on the effect of particular types of engagement or conservation activities on water consumption (sub-bullet (b)); however, detecting LATE effects of engagement or conservation activities will be statistically challenging, given the presence of multiple pathways to affect water usage in our context. We define these outcomes below, but will consider these analyses supplementary and likely primarily descriptive. If there is evidence of multiple forms of engagement, it may not be possible to assign the causality to each method of engagement. Yet, if the engagement suggests a clear pathway, we may be able to draw causal inferences about that pathway.

a. ITT: If the primary path of the effect of the message is reactive, we expect to see the strongest effect of messaging in the context of leaks. Alternatively, if the messaging induces preventative actions, the effects on water consumption may be present even in the absence of leaks. That said, overall water usage has many

driving factors, the effects of which may difficult to disentangle from those of preventative actions.
    i. Water consumption when there is a leak; i.e., severity of leak (this requires linking leak data with water usage AMI data)
    ii. Water consumption when there is not a leak (this is indicative of one of the other channels at work – general or other engagement types)

b. LATE: how much do leak alerts drive water usage reductions?: In order to be able to measure this effect, we will need to have sufficient variation in leak alert enrollment
    i. If we expect leak alert un-enrollment due to messages, should be able to examine the effect of the leak alert (as separate from messaging) on the leak outcomes (frequency, length, severity). I.e., random assignment into treatment induces variation in leak alert un-enrollment rates → variation in leak alerts received → effect of leak alert on outcome

c. LATE: does other type of engagement lead to water consumption reductions? Compare and contrast the effect of all the different measured engagement variables in the same vein as III.b.
    i. General: portal login, unsubscribe
    ii. Leak-related: leak alert website visits, leak alert setting updates

d. LATE: does other type of action lead to water consumption reductions?
    i. Other (observable): rebate website visits, etc.

For each of these outcome measures, we plan to examine the heterogeneity in response by those whose behavior is less (vs more) aligned with social objectives of conservation. This may include (1) pre-treatment conservation activities, (2) pre-treatment engagement with the water utility, (3) pre-treatment leak frequency, length and severity, as well as (4) individual household characteristics such as home size / value, household composition, etc. as data permits, which can reveal preferences that may or may not be aligned with conservation. We also plan to use the pre-treatment data as predictors to help increase statistical power wherever possible. This may be done through fixed effects or as controls in regressions. In short, we expect the analyses to follow the approach in Brecko and Hartmann (2022)