

Community green: Comparing Individual and Social Financial Motivations in Energy Conservation

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This field experiment demonstrates how individual financial and social motivation incentives to conserve energy can affect a community's electricity consumption patterns. Baseline measures of weekly consumption were taken in a faculty condominium community, followed by either a) no email, b) an email emphasizing an individual's chance to win a financial prize for conserving, along with conservation tips, or c) an email emphasizing a whole building's chance to share a financial prize for conserving, along with conservation tips. Individual feedback on consumption relative to baseline use was sent two weeks following the intervention email. Results indicate that social motivation is especially effective among baseline low consumers but elicits reactive effects among baseline high consumers. In contrast, individual financial motivation is especially effective among high consumers. Based on these findings, a theoretical explanation for the reactivity among high consumers in the social condition, along with suggestions for interventions tailored toward existing high or low consuming communities and educational interventions, is discussed.

Introduction

Background

Social norms have a powerful unconscious influence on behavior, despite conscious belief that they have little impact on personal choices.¹ Social comparison theory explains that norms are powerful because comparing oneself to the norm establishes the appropriate level of that behavior.² Uncertainty about how often to perform a behavior decreases, reducing cognitive load and putting people at ease. Nolan et al. found that although the belief that the majority conserves natural resources produced the most behavior change, participants rated normative beliefs as the least influential on behavior.¹ What the authors

didn't identify were potential steps between awareness of the norm and behavior change.

From Nolan and colleagues, we know it is important to include the perception that others are conserving.¹ The types of norms presented, however, can be just as significant. Descriptive norms refer to the perception of how common a behavior is; in contrast, injunctive norms refer to the perception of social approval of that behavior.³ Schultz et al. found that for people using higher levels of energy than average, descriptive norm information (i.e., "You use more energy than the average person") produced significant decreases in energy consumption.⁴ However, for people already consuming less than average, descriptive normative information actually resulted in greater consumption. The authors claim this boomerang effect results from the desire to grow closer to the norm from either direction (previous high or low consumption), further reinforcing the power of social influence. However, the boomerang effect was eliminated through the use of an injunctive norm—a smiling emoticon when people conserved and a frowning emoticon when they didn't—in addition to descriptive feedback. In this case, people who were consuming more than average decreased as much as in the descriptive condition, and people who were consuming less than average maintained their better-than-average behavior.

These findings also highlight the importance of feedback on performance, which establishes the social norm as a standard and sets up expectations for personal behavior. In Schultz's study on curbside recycling, personal norm feedback and group norm feedback were both effective in increasing recycling, while standard informational interventions and pleas failed to produce the same effect.⁵ Therefore, both personal and collective goals should be effective in increasing pro-environmental behaviors in a community-based conservation campaign.

One important aspect of the Schultz et al. findings is that in no condition did those already consuming less than average actually improve.⁴ Therefore, while normative influence is important, it may be incomplete. Siero and colleagues emphasize that creating a common group identity can increase collectively beneficial behavior change.⁶ In the context of energy conservation in faculty housing, membership in the campus community can serve as an automatic

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social tie among residents. Therefore, combining the norm that a particular community's residents conserve with some reminder of their social ties to one another and potential collective benefit of conserving could be particularly effective in motivating greater conservation.

In particular, Loersch et al. highlight the effect of goal contagion among members of the same social group.⁷ The authors define goal contagion as the motivation and pursuit of a goal as a result of identifying another person's goal-directed behavior. They conclude that goal contagion is especially likely when the behavior—directly observed or assumed—belongs to a member of a common ingroup. Therefore, identifying conservation as a common goal of community members may serve to increase goal contagion.

In order to truly assess the potentially powerful effects of ingroup-specific appeals, there must be a standard proven motivational appeal to produce more collectively beneficial behavior, in this case, energy conservation. Durant et al.'s review of motivational strategies toward higher productivity in organizations illustrates the effectiveness of lottery-based financial motivation, at least during the length of the experimental trial.⁹ Therefore, creating a financial motivation to conserve should be effective in eliciting more conservation behaviors in the short term and may provide a good basis to which to compare more social-psychological appeals.

Hypothesis

Based on the above evidence, several conclusions may be drawn. First, establishing either personal or social norms toward greater conservation is likely to produce increases toward conservation goals.⁵ Second, establishing a social norm to motivate conservation is likely to be especially effective if goal contagion can be produced, for instance, by establishing a norm of conservation to achieve a common community goal and emphasizing the specificity of that community.⁷ ⁸ Finally, the use of both descriptive and injunctive norms in the form of feedback on performance may help to alleviate the effect of mere gravitation toward the norm among both pre-existing conservers and high consumers.

Therefore, the present study predicts that members of a faculty housing community will be motivated to conserve energy both when a personal

goal toward conservation (via financial motivation to potentially win a personal monetary prize) and when a collective goal toward conservation (via financial motivation to win a collective prize and join in the community norm toward conservation) are presented. However, it is predicted that the social motivation will be more effective among pre-existing low consumers than pre-existing high consumers because a personal norm of conservation has already been established, so the social norm adds additional motivation. Additionally, the financial motivation condition should be effective among all participants because it establishes the possibility of a reward in the near future and does not require sustained changes in behavior. Finally, it is expected that a feedback reminder will help sustain effects of these treatments into the third week of post-manipulation measurement (whereas no additional messaging—not studied here—may cause a drop-off in conservation).

Method

Electricity consumption was tracked in 55 condominiums in a Stanford faculty housing community. Participants were recruited via an email forwarded from the homeowner's association president linked to an online consent form. Included in the online consent form was a survey assessing current attitudes and behaviors about conserving (e.g., Overall, how much of an effort do you feel you have already made to conserve energy in your home, for instance, by buying energy efficient products, turning off electronics, etc.?). Responses were marked on a 5-point Likert scale. In addition, this survey asked participants to estimate how many days they would be gone each week during a 6-week interval during the summer, during which time consumption readings would be obtained.

Approximately one month after gathering consent, three weeks of baseline measurement began. Measurements of kilowatt-hour usage were gathered from digital smart meters. Buildings were first categorized by square footage, and buildings within each category were randomly assigned to control, financial motivation, or social commitment motivation conditions. This procedure assured that there would be an equal distribution of building sizes in each condition.

In the control condition, the energy consumption of each condominium continued to be measured weekly for the next three weeks without any communication

to residents. In the financial motivation and social commitment conditions, residents received an email directly from the researcher on the day of final baseline collection. While both emails outlined the chance to win a condo's share of the building's \$1000 prize and provided the same tips on how to conserve, one emphasized the individual financial reason to conserve (the chance for a monetary prize) while the other emphasized the community value of conserving and emphasized how the prize could be used collectively rather than individually (see Appendix for complete text).

After sending emails to both groups, weekly consumption data was gathered for three additional weeks. Additionally, two weeks after the emails were sent, residents received emails with feedback on their recent consumption compared with their baseline consumption. Residents were divided into 4 groups based on the original email they received and on their recent consumption patterns: financial motivation/consumption decreased, financial motivation/consumption increased, social commitment motivation/consumption decreased, and social commitment motivation/consumption increased. There were no cases in which consumption didn't change at all, and in those cases in which consumption only changed marginally, participants were still divided according to their marginal increase or decrease. According to these categories, participants were sent one of four emails which first provided feedback on whether their households had increased or decreased consumption and included a smiling or frowning emoticon accordingly, then reminded participants of either the individual financial or social commitment motivation they had received originally (see Appendix for complete text).

After sending this booster email, consumption was tracked for one more week. Following the last week of measurement, buildings that had decreased consumption on average (even if certain condos within the building had increased) since the intervention email were entered into a random lottery for a \$1000 prize and one was selected. The selected building had 5 participating condos; therefore, a \$200 check was mailed to each one.

Results

3 units were removed from the final analysis. One unit reported that its residents had to move out due to a flood halfway through the study and thus had

atypical usage. The other two showed usage greater than 2.5 standard deviations from mean consumption at pre- and post-manipulation and were in the same treatment condition.

Variables corresponding to average weekly use were separated into pre-manipulation use (baseline data) for weeks 1-3, post-manipulation use for weeks 4-6, and post-booster use for week 6. The distinction between post-manipulation and post-booster was done to separate the effects of the original manipulation and the feedback email sent 2 weeks later. After removing the outliers, all variables were normally distributed and thus were not transformed.

Main effects of treatment vs. control and of each condition separately were tested first unadjusted for unit type and then adjusted. When adjusting for the participants who didn't report days gone, there was a main for post-booster use but not for post-intervention use in general ($p < 0.05$). More significantly, an interaction between standardized pre-use and post-use remained significant either way (post-manipulation and post-booster) for the social condition ($p < 0.01$; Figure 1).

When the data is divided into pre-existing high consumers (1 SD above mean baseline use) and pre-existing low consumers (1 SD below mean baseline use), the differences between the financial and social conditions become more apparent. Specifically, higher pre-use was associated with significantly greater post-use and lower pre-use with significantly lower post-use in the social condition relative to financial and control conditions. This effect held true when comparing social to control or social to both conditions combined. When comparing to the financial condition only, the pre-manipulation low users in the social condition did not use significantly less energy, but pre-manipulation high users did use significantly more. Additionally, the financial condition significantly lowered post-use (not only post-booster use) among baseline high consumers but not baseline low consumers.

Discussion

It was predicted that among all participants, the personal financial motivation and collective motivation conditions would be effective in eliciting lower consumption. Furthermore, it was predicted that social motivation would be more effective among baseline low consumers than baseline high consumers, whereas individual financial motivation would be more

uniformly effective. While the first hypothesis did not hold, the second one did to some extent. That is, when baseline usage was not controlled for, participants in the individual motivation condition significantly dropped usage after the manipulation and feedback email, whereas participants in the social motivation condition did not. The fact that the financial condition significantly lowered usage after the booster email supports the auxiliary hypothesis that feedback would sustain and perhaps even enhance the effects of the original treatment messages. However, when participants were split into high and low baseline consumers, the social condition but not the financial condition was effective among low consumers. Interestingly, among baseline high consumers, there seemed to be a boomerang effect in the social motivation condition, resulting in even higher consumption post-treatment. However, the individual financial condition was especially effective in this group.

Limitations and directions for future research

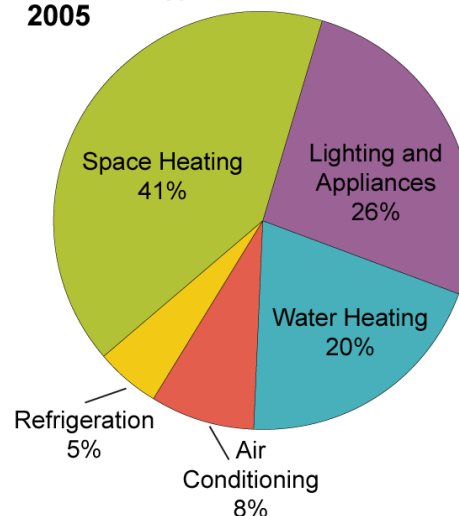
Several limitations of this study should be noted. First, the sample population chosen may be unrepresentative of general residential neighborhoods, as residence requires affiliation with the Stanford community. Therefore, future research should look into communities without a common identity marker (such as belonging to academia).

Second, all six data points were collected between the months of July and August, which may not have yielded appropriate variation in usage since academics could take trips for summer vacation (leaving vacancies) and since Americans typically use much more energy for heating than for cooling (Figure 1).¹¹ Because of greater room for variation in winter months, it will be useful in future studies to examine behavior over a wider range of seasons, or at least later in the year than the data gathered here.

Third, these analyses did not control for family size. In future measurements, researchers may wish to gather data in terms of usage per person instead of usage per household.

Finally, future investigations should broaden conservation appeals to include other resources such as gas or water. It may be that there are carryover effects; that is, by reminding people about electricity conservation, they may also be primed to be more mindful about conservation of gas or water. Conversely, moral credentialing effects could occur when only one

How Energy is Used in Homes, 2005



Source: Energy Information Administration, 2005
Residential Energy Consumption Survey.

Figure 1 Percentage break down of home energy usages.

type of conservation is brought to residents' attention: By making residents more mindful of one type of pro-environmental behavior, they may feel like they have sufficiently contributed to the environmental cause and thus licensed to exert less effort toward another.^{12, 13}

Implications

The fact that high consumers responded to individual financial motivation favorably but reacted against social motivation calls into question how pre-existing attitudes about energy usage may change construal of a persuasive message. Research suggests that persuasive messages may be more threatening to people for whom the message is most relevant; for instance, heavy coffee drinkers who read an article linking caffeine to breast cancer were more likely than light coffee drinkers to reject the message as untrue.¹⁰ The authors explain this finding as a threat to participants' self-image, which results in cognitive dissonance between the behavior they enjoy (drinking coffee) and an unhealthy consequence. This dissonance is then resolved by rejecting the message as untrue. Similarly, high consumers in the social condition may experience dissonance between a positive self-image and a message emphasizing the negative quality of their consumption and thus disregard the message to resolve this dissonance.

Why, then, didn't high consumers react against the individual financial motivation appeal? Perhaps construal was shifted in this condition from

a threatening, morally tinged message to simply the chance to win some money. Consequently, there is no threat to the self-image and thus no reactance. However, when a social norm is attached to conserving and the message implies that an individual would be letting down the entire building's chance of winning by not conserving, the individual could construe the situation as much more judgmental and threatening.

Typically, self-affirmations have proven successful in reducing reactance to threatening messages.¹⁰ However, the self-affirmation approach itself seems less applicable in this case. Rather, changing core attitudes about conservation or one's relationship to nature could reduce the threatening impact of the message.

One potential method to change attitudes about conservation could be perspective taking, a technique shown to increase empathy toward other people and concepts such as nature in clinical practice.^{14, 15} Persuasive messages could guide the reader to take the perspective of the environment by being written from the perspective of a natural resource, for instance. In line with Stern's Value-Belief-Norm (VBN) theory, attitudes of greater connectedness to nature could induce greater conservation because of a transition toward inclusion of nature in the self-concept.¹⁶ The question arises, however, how to put theory into practice in a wide scale campaign.

Advertising may not be the best way to change long-standing attitudes about nature and pro-environmentalism, but educational campaigns may be more successful. Attitudes about smoking changed dramatically in the United States due to major changes in educational strategy; similarly, if habitual conservation behavior is formed through pro-environmental behaviors fostered in school at an early age, national attitudes and consequential behaviors may change as well.¹⁷

Such widespread change is outside the scope of this study; however, these preliminary findings do suggest that social commitment motivation may be a promising technique to explore further in eliciting greater conservation behaviors. Previous studies have not been able to further decrease consumption among already existing conservers, whereas the present experiment illustrates that social commitment not only elicits this effect, but does so better than pure financial motivation.⁴ The differential reaction to a persuasive

appeal among baseline low and high consumers requires further attention to determine how policy may address groups who construe messages about environmentalism differently, but for now we at least know that certain groups of people may be motivated to conserve not purely out of self-interest but out of some commitment to community efforts. The next question, then, is how to broaden this motivation beyond pre-existing conservers for wider societal impact.

References

1. Nolan JM, Schultz PW, Cialdini RB et al. Normative social influence is underdetected. *Pers Soc Psychol Bull* 2008; 34(7): 913-923.
2. Festinger L. A theory of social comparison processes. *Hum Relat* 1954; 7(2): 117-140.
3. Cialdini RB, Kallgren CA, & Reno RR. A focus theory of normative conduct. *Adv Exp Soc Psychol* 1991; 24: 201-234.
4. Schultz PW, Nolan JM, Cialdini RB et al. The constructive, destructive, and reconstructive power of social norms. *Psychol Sci* 2007; 18(5): 429-434.
5. Schultz PW. Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic Appl Soc Psych* 1998; 21(1): 25-36.
6. Siero FW, Bakker AB, Dekker GB et al. Organizational Energy Consumption Behavior through Comparative Feedback. *J Environ Psychol* 1986; 16: 235-246.
7. Loersch C, Aarts H, Payne BK et al. The influence of social groups on goal contagion. *J Exp Soc Psychol* 2008; 44: 1555-1568.
8. McMakin AH, Malone EL, & Lundgren RE. Motivating residents to conserve energy without financial incentives. *Environ Behav* 2002; 34(6): 848-863.
9. Durant RF, Kramer R, Perry JL et al. Motivating employees in a new governance era: The performance paradigm revisited. *Public Admin Rev* 2006; 66(4): 505-514.
10. Sherman DAK, Nelson LD, & Steele CM. Do messages about health risks threaten the self? Increasing the acceptance of threatening health messages via self-affirmation. *Pers Soc Psychol Bull* 2000; 26:1046-105
11. U.S. Energy Information Administration. (2009).

- Use of energy in the United States explained: Energy use in homes. Retrieved January 22, 2010, from the U.S. Energy Information Administration Web site: http://tonto.eia.doe.gov/energyexplained/index.cfm?page=us_energy_homes.
12. Monin B & Miller DT. Moral credentials and the expression of prejudice. *J Pers Soc Psychol* 2001; 81: 33-43
 13. Sachdeva S, Ilic R., & Medin DL. Sinning saints and saintly sinners: The paradox of moral self-regulation. *Psychol Sci* 2009; 20(4): 523-528.
 14. Davis MH, Conklin L, Smith A et al. Effect of perspective taking on the cognitive representation of persons: A merging of self and other. *J Pers Soc Psychol* 1996; 70(4): 713-726.
 15. Schultz PW. Empathizing with nature: The effects of perspective taking on concern for environmental issues. *J Soc Issues* 2000; 56(3): 391-406.
 16. Stern PC. Information, incentives, and proenvironmental consumer behavior. *J Consum Policy* 1999; 22: 461-478.
 17. Riordan M. (2009). Public education campaigns reduce tobacco use. Retrieved January 30, 2010, from <http://www.tobaccofreekids.org/research/factsheets/pdf/0051.pdf>.



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