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# Do We Recommend Lower Electricity Consumption after Priming with Pro-social and Intrinsic Values?

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## Abstract

The standard approach to changing people's energy consumption, which involves information about appropriately structured economic incentives, is becoming increasingly questioned. In an experiment, we investigated if it is possible to affect the electricity consumption recommended for the average American citizen by priming participants with either pro-social aspects of the "American stereotype" (intrinsic values) or by superficial and self-enhancing aspects of the "American stereotype" (extrinsic values). The results showed that the participants that were primed with extrinsic values recommended significantly higher electricity consumption for the average American, as compared to both the intrinsic value priming condition and to a neutral control condition.

**Keywords:** Intrinsic values, priming, MTurk, sustainable behavior

## Introduction

The standard techno-economic model, which has traditionally dominated policy interventions in the energy sector, has become increasingly questioned (Stern, 2011). The effects of information and economic incentives are typically smaller than economic models would predict. From this, often large so called energy efficiency gap (Jaffe & Stavins, 1994), it has become clear that to decrease the gap it is necessary to pay more attention to the psychological processes. Some studies have focused on the importance of social norms for the acceptance of climate change strategies (Nilsson, von Borgstede, & Biel, 2004), others have looked closer at the feedback processes in energy use (Fisher, 2008). Yet others have highlighted the importance of tailored interventions, monitoring the target behavior (Steg & Vlek, 2009). A subcategory of the latter group has looked more in detail into how values and identity are related to environmentally friendly behavior. In two experiments, Bolderdijk et al. (2012) investigated how an economic vs. biospheric appeal affected the number of people that checked the air pressure in their tires at a petrol station. A significantly larger number of people checked their tires with the biospheric appeal. The reason for this, according to the authors, is that when complying with the biospheric appeal the participants can nurture a

positive self-concept. The economic appeal, on the other hand, rather makes them feel stingy and greedy.

A slightly different interpretation of the petrol station study is offered by value research. The basic assumption behind the value research is that priming or activating a set of values increases a certain type of behavior and decreases the incidence of behaviors associated with an opposing value. The theory is derived from Schwarz (1992) value model, proposing that all humans are guided by values, which in turn are expressed in ten different motivators (e.g. power, hedonism, benevolence and security). The motives can be modeled in a circle, divided into four superordinate opposing values: self-transcendence vs. self-enhancement and conservation vs. openness to change. Values at about 180 degrees and hence motives generate contradictory behavior, and typically generate null correlations, whereas adjacent values and motives have strong correlations (Maio et al., 2009). There is another model, based on goals rather than values (Grouzet et al., 2005), yielding the same predictions but with a slightly different terminology. The model is built on the assumption that there are two dimensions, one opposing intrinsic and extrinsic goals and the other contrasting physical and self-transcending goals. The idea is that the goals are in conflict with each other and, thus, the person has to negotiate with herself to choose a line of behaviors that is compatible with the demands (Maio et al., 2009). In a series of experiments Maio et al. (2009) investigated how priming certain values affected value congruent and incongruent behaviors. They concluded that priming a set of values indeed increases a certain type of behavior and decreases behavior associated with an opposing value. Applied to Bolderdijk et al.'s (2012) study, the biospheric appeal tapped into the participants' intrinsic values, whereas the economic appeal triggered extrinsic values, which were incongruent with environmentally friendly behavior.

Sheldon, Nichols, and Kasser (2012) propose that intrinsic values are part of the American identity, and in line with the social identity theory (SIT; Tajfel, 1981) they suggest that an activation of that identity will cause the person to act in line with the values attached to that identity or group norm. Furthermore, when priming people with a certain identity, people are likely to act and hold attitudes in line with the values attached to that identity. Which val-

ue set associated with a certain social identity that is activated depends on the social context.

By priming people with a value one can attempt to control the context, and thus emphasize a set of values or an identity. “Priming” is defined by Tulving and Schacter (1990) as “a change in the ability to identify or produce an item as a result of a specific prior encounter with the item”. There are different kinds of priming, here we focus on semantic priming, defined as the association strength between two or more concepts that have a semantic relatedness in memory (Topolinski & Deutsch, 2013).

## The Present Study

In the present study, we wanted to investigate how priming people with an identity affect their attitudes to electricity consumption. The design was in many respects inspired by Sheldon et al.’s (2011) study, except that the outcome variable in their study was recommended carbon footprint. The essence of the design is the assumption that depending on what aspects of a social identity (in this case the American identity) that are activated, the participants will act differently, but always in line with the norms attached to the specific social identity. In other words, by activating a certain identity, thereby increasing the access to certain lines of reasoning and certain arguments, we propose to manipulate the likelihood that the participants will act in line with the attitudes and behaviors attached to that role.

The experiment investigated the extent to which priming affected the amount of electricity participants recommended that other citizens should consume for everyday activities. The intrinsic priming was a short text that reminded the participant of the pro-social values attached to the stereotypical conception of an “American” (e.g., generosity and responsibility). The extrinsic priming condition reminded the participant of the superficial and selfish values attached to the stereotypical conception of an “American” (e.g., a focus on material gains, competitiveness). The control condition just referred to the participants as Americans, without emphasizing any specific values (the survey was administered on AMT and directed specifically to an American audience). To assure that the contents of the priming manipulation were properly encoded half of the participants in each priming condition were required to engage in an additional elaboration of the content of the texts intended as primes.

We predicted that an intrinsic priming condition would recommend significantly lower electricity consumption than an extrinsic priming condition and a control group. This is in line with previous research (e.g. Sheldon et al., 2011; Kamenica, 2012) showing

that people are more inclined to recommend less usage of natural or common resources when primed with pro-social values. We also used two explicit attitude tests: attitudes to energy conservation and perceived behavioral control (Abrahamese & Steg, 2009) and attitudes to reduced electricity consumption (Ek & Söderholm, 2010). By including both an indirect behavioral measure and an attitudinal measure we hoped to capture the differences, if any, that were caused by the priming. Finally, we included a measure of numeracy, BANT (the Berlin Advanced Numeracy Test: Cokely et al., 2012), in order to investigate if the quantitative assessments of electricity consumption were affected by the participant’s numeracy. The experiment was conducted on AMT (Amazon Mechanical Turk) via the crowdsourcing site Crowdfunder.

## Method

### Participants, Stimuli and Design

The experiment included a total of 351 participants, 185 women and 165 with mean age 32.1 years ( $SD=12.6$ ). They completed 23 items in one trial and were paid \$ 0.30 to complete the task, which lasted approximately 8 min.

The task was presented to the participants as a survey with the goal to explore factors in human judgment and decision making. Trials were constructed in Lime Survey, and connected to AMT via Crowdfunder. The background color was a default theme in Lime survey: blue, with white text in Arial 14 points.

The experiment was a 2x3 factorial between-subjects design with priming condition and elaborating task/no elaboration task as independent variables. The primary dependent variables were amount of electricity consumption recommended and the points on the Abrahamese and Steg’s (2009) and Ek and Söderholm’s (2010) energy consumption attitude tests.

### Procedure

The priming stimulus was a short text, reminding the participants of either the extrinsic or the intrinsic side of the American character (Sheldon et al., 2011). The intrinsic American prime was phrased as:

“Now we would like to know more about you as an American. The American people are known around the world for their generosity, and their willingness to pull together in times of need. Americans are also known for their ideal of self-expression and personal development, and for their strong family values”.

The extrinsic American prime was expressed as:

“Now we would like to know more about you as an American. The American people are known around the world for their focus on wealth, financial success, and material gain. Americans are also known for their competitiveness, and for their movie industry with its Hollywood ideals of beauty, celebrity, and fame.”

And, finally, the control condition (neutral American) read:

“Now, we would like to know more about you as an American”.

After the priming, half of the participants (elaboration condition) were asked to list three needs that all Americans share in common. After that, all participants were asked to rate their policy preferences relevant to Americans’ electricity consumption. Concretely, they were asked to recommend average consumption of for the following 10 widely used electricity consuming appliances and activities. The questions were phrased as follows:

1. How many times per week do you recommend that one uses the dishwasher?
2. How many minutes per day do you recommend that one uses the oven?
3. How many hours per day do you recommend that one watches TV?
4. How many hours per day do you recommend that one uses the computer?
5. How many degrees Farenheit do you recommend as the average room temperature?
6. How many times per week do you recommend that one uses the tumble dryer (0 indicates that one lets the laundry air dry)?
7. How many minutes do you recommend for an average shower?
8. How many times a week do you recommend that washing machine be used?
9. How many minutes per day do you recommend that one uses the micro oven?
10. How many minutes per day do you recommend that one uses the stove?

Before the priming, participants completed two surveys: background variables (gender, age and educational background) and BANT (Berlin Advanced Numeracy Test: Cokely et al., 2012). The previously mentioned attitude tests were not administered until after the priming and electricity recommendations, in order to avoid any confounding effects arising from filling out the attitudes tests. Before being ex-

posed to the priming texts, participants were also asked to read a text about the reasons for consuming less electricity as well as continuing consuming electricity at the current level. The rationale for including a text about electricity was to follow Sheldon et al.’s (2011) original design, and to secure that all participants had a basic notion about what electricity is and how it used to generate energy.

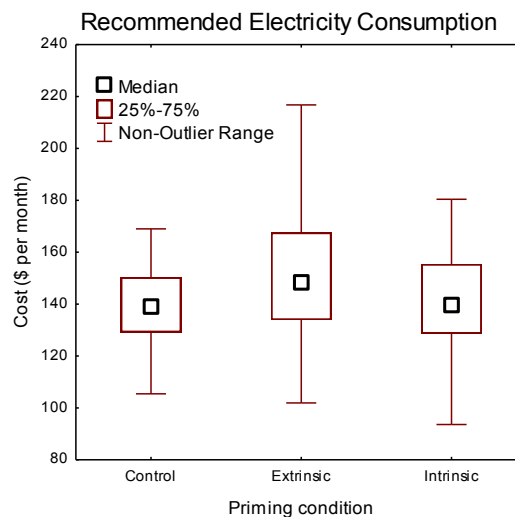


Figure 1. The median monthly cost in dollars for the recommended electricity consumption of the average American in each of the three priming conditions of the experiment.

## Results

Data from the electricity consumption variables were not normally distributed due to many outliers and there was heterogeneity in the variance. For this reason, non-parametric tests were used for all analyses. The recommended electricity consumption data were recalculated into price in dollars (\$ 0.12/h) by transforming the usage times into kWh according to the Swedish Energy Agency’s (Energimyndigheten, 2009) key figures for electricity usage. In that way, the individual relationship between the electricity posts (e.g., the temperature and the computer) was intact, while the different units were transformed to a common scale. The sum, in dollars per month, of the electricity consumption was computed for each participant, and a Kruskal-Wallis test revealed that the recommended electricity consumption differed significantly between priming groups ( $\chi^2(2, N = 317) = 9.013, p = .011$ , two-tailed) but not between the elaboration/no elaboration groups ( $U = 12402, N_1 = 156, N_2 = 161, p = .849$ , two-tailed). Moreover, visual inspection of the medians in each cell revealed no signs interaction between the priming and elaboration conditions. The median recommended monthly electricity in the control condition and in the intrinsic value priming condition was the

same, \$139, while median recommended consumption in the extrinsic value priming condition was \$ 148. Further analysis of the priming conditions, revealed that there was a significant difference between American control and extrinsic priming ( $U = 3951$ ,  $N_1 = 89$ ,  $N_2 = 114$ ,  $p = .007$ , two-tailed), intrinsic and extrinsic priming ( $U = 5286$ ,  $N_1 = 114$ ,  $N_2 = 114$ ,  $p = .015$ , two-tailed) but not between intrinsic and American control ( $U = 4938$ ,  $N_1 = 89$ ,  $N_2 = 114$ ,  $p = .745$ , two-tailed). Thus, as illustrated in Figure 1, the median recommended consumption in the extrinsic value priming was significantly higher than in the other two conditions, but the results were associated with large individual differences.

A Kruskal-Wallis test on the number of points at the attitude tests for the priming conditions revealed no significant differences for neither attitudes to energy conservation and perceived behavioral control (Abrahamese & Steg, 2009), ( $\chi^2(2, N = 315) = 4.465$ ,  $p = .107$ ), nor for attitudes to reduced electricity consumption (Ek & Söderholm, 2010), ( $\chi^2(2, N = 316) = 0.860$ ,  $p = .650$ ). Nor did the elaboration conditions generate any significant differences for either of the attitude tests: attitudes to energy conservation ( $U = 11956$ ,  $N_1 = 155$ ,  $N_2 = 160$ ,  $p = .580$ ) nor attitudes to electricity ( $U = 11994$ ,  $N_1 = 155$ ,  $N_2 = 161$ ,  $p = .549$ ). A visual inspection did not reveal any interaction effects between the two independent variables.

There were two significant, but, weak correlations between the background variables. There was a significant negative correlation between age and gender ( $r = -.146$ ,  $N = 347$ ,  $p < .006$ ), males were somewhat younger, and a positive significant correlation between age and attitudes to energy conservation and perceived behavioral control ( $r = .134$ ,  $N = 315$ ,  $p < .017$ ). The latter correlation suggests that higher age goes with more positive attitudes to energy conservation.

## Discussion

The results revealed significant differences in the recommended electricity consumption between the extrinsic and the intrinsic priming conditions, with a higher recommended electricity consumption with extrinsic value priming. There were no significant effects of whether the participants elaborated or not on the material. Furthermore, there were no significant effects on the environmental attitude tests.

The difference between extrinsic and intrinsic in median recommended electricity consumption was modest in magnitude (\$148 vs. \$139). Notably, the results replicate the basic results in Sheldon et al.'s (2011) study, who presented significant differences between extrinsic and intrinsic American priming in recommended size of carbon footprint. However,

there were also some unexpected differences, in that the American control and extrinsic American prime, in Sheldon et al. yielded the same carbon footprint recommendations. On the other hand, in Sheldon et al. there was another priming condition called Missouri student, which yielded the same recommendations as the intrinsic American priming group. It seems as if identity primes which are designed as neutral, are connected to the contextually available values. A tentative interpretation of the results is that participants look for cues how to act, when they are not present. The text about electricity and/or the very task to recommend electricity consumption for an average American citizen may have provided a cue for the control group to act environmentally friendly. In other words, the "default-prime" for this content may fall closer to the intrinsic value prime, considering the current debate on environmental issues.

The most interesting result, though, is that it seems to be possible to affect how much electricity people recommend by simply reminding them about either pro-social (intrinsic) or egocentric (extrinsic) values. Notably, the effect was not achieved by an implicit or subliminal priming procedure, but by letting the participants read a text about values of the American spirit. This is what Schwartz's (1992) and Grouzet et al.'s (2005) models predict, namely that the values expressed in the intrinsic American text will promote an environmentally friendly behavior, and the opposite for extrinsic values.

The interpretation of the results would have been unambiguous had it not been for the lack of association between value prime (intrinsic/extrinsic) and the attitude measures. One possibility is that the attitudes tests measure more permanent attitudes to electricity and energy consumption, which are not so easily affected by value priming. Other possible explanations are that the priming effect may not have lasted long enough to be visible when participants came to the attitude questions (the very last questions in the experiment) or that the attitude instruments themselves suffer from limited reliability.

Previous research has showed that the lag of semantic priming effects can be long lasting, provided that the participant engages in same level of processing for both the prime as the target. Another criterion, for longer (semantic) priming effects, is the degree of overlap of semantic features between the prime and target (Becker et al., 1997). In a more recent study, de Lange et al. (2011) show that the weight of evidence in decision making is dependent on the level of processing: participants showed a strategic bias for stimuli processed on a higher level.

Applied to the present data, a possible interpretation of the absence of priming effect on the attitude tests, could be that there is little overlap between the prime (intrinsic and extrinsic values) and attitudes to electricity and energy consumption. More importantly, the text that constitutes the prime, in both conditions, does not require much processing of the participant, possibly, resulting in a short priming effect.

In the light of this, future experiments would focus on the processing aspect of the prime. First, in order to establish whether the same priming effect can be achieved for attitude tests, second, to possibly enhance the priming effects on the electricity consumption. This is important, since priming is an inherently volatile phenomenon, and if the procedure is to be applied in wider context they must be more reliable than at present.

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### References

- Abrahamese, W., & Steg, L. (2009). How do socio-demographic and psychological factors relate to households' direct and indirect energy use and savings? *Journal of Economic Psychology*, *30*, 711–720.
- Becker, S., Moscovitch, M., Behrmann, M., & Joordens, S. Long-Term Semantic Priming: A Computational Account and Empirical Evidence. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 1059-1082.
- Bolderdijk, J.W., Steg, L., Geller, E.S., Lehman, P. K., & Postmes, T. (2012). Comparing the effectiveness of monetary versus moral motives in environmental campaigning. *Nature Climate Change*, *3*, 410-413.
- Cokely, E.T., Galesic, M., Schulz, E., Ghazal, S., Garcia-Retamero, R. (2012). Measuring Risk Literacy: The Berlin Numeracy Test. *Judgment and Decision Making*, *7*, 25–47.
- de Lange, F.P., van Gaal, S., Lamme, V.A.F., & Dehaene, S. (2011). How Awareness Changes the Relative Weights of Evidence During Human Decision-Making. *PLoS Biology*, *9*, 1-10.
- Ek, K., & Söderholm, P. (2010). The devil is in the details: Household electricity saving behavior and the role of information. *Energy Policy*, *38*, 1578–1587.
- Energimyndigheten (2009). Spara energi – och dryga ut hushållskassan. Retrieved from: <http://www.energimyndigheten.se>
- Fischer, C. (2008). Feedback on household electricity consumption: A tool for saving energy? *Energy Efficiency*, *1*, 79–104.
- Grouzet, F. M. E., Kasser, T., Ahuvia, A., Dols, J. M. F., Kim, Y., Lau, S., et al. (2005). The structure of goal contents across 15 cultures. *Journal of Personality and Social Psychology*, *89*, 800–816.
- Jaffe, A. B., & Stavins, R. N. (1994). The energy-efficiency gap: What does it mean? *Energy Policy*, *22*, 804 – 810.
- Kamenica, E. (2012). Behavioral Economics and Psychology of Incentives. *Annual Review of Economics*, *13*, 1-26.
- Maio, G. R., Pakizeh, A., Cheung, W.-Y., & Rees, K. J. (2009). Changing, priming, and acting on values: Effects via motivational relations in a circular model. *Journal of Personality and Social Psychology*, *97*, 699–715.
- Nilsson, A., Von Borgstede, C., & Biel A. (2004). Willingness to accept climate change policy measures: The effect of values and norms. *Journal of Environmental Psychology*, *24*, 267- 277.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*, 1–65.
- Sheldon, K.M., Nichols, C.P., & Kasser, T. (2011). Americans Recommend Smaller Ecological Footprints When Reminded of Intrinsic American Values of Self-Expression, Family, and Generosity. *Ecopsychology*, *2*, 97-104.
- Stern, P.C. (2011). Contributions of Psychology to Limiting Climate Change. *American Psychologist*, *6*, 303-314.
- Tajfel, H. (1981). *Human groups and social categories: Studies in social psychology*. Cambridge: Cambridge University Press.
- Topolinski, S., & Deutsch, R. (2013). Phasic Affective Modulation of Semantic Priming. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *39*, 414–436
- Tulving, E., & Schacter, D.L. (1990). Priming and Human Memory Systems, *Science*, *247*, 302-306.