To Buy or Not to Buy or Can be 'Nudged' to Buy?

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Prayas Energy Group

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About Prayas

Prayas (Initiatives in Health, Energy, Learning and Parenthood) is a nongovernmental, non-profit organization based in Pune, India. Members of Prayas are professionals working to protect and promote the public interest in general, and interests of the disadvantaged sections of the society, in particular. The Prayas Energy Group works on theoretical, conceptual regulatory and policy issues in the energy and electricity sectors. Our activities cover research and intervention in policy and regulatory areas, as well as training, awareness, and support to civil society groups. Prayas Energy Group has contributed in the energy sector policy development as part of several official committees constituted by Ministries and Planning Commission. Prayas is registered as SIRO (Scientific and Industrial Research Organization) with Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India.

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Abstract

Recent advancements in behavioral sciences have spurred a lot of interest in its application in the field of energy efficiency and conservation. Cost effective behavioral interventions have shown to induce energy consumers to take positive steps towards reducing energy consumption. This paper aims to spark interest amongst researchers, policymakers, utilities, appliance manufacturers and other stakeholders to organize and undertake concerted research in behavioral interventions in energy efficiency and conservation in India and make use of the knowledge to design effective policies. In this paper we identify the challenges to behavioral interventions in the Indian context and suggest a possible approach to overcome them and steer the direction of behavioral research.

1. Introduction

Looking to replace his old and clunky refrigerator, a customer goes to a local appliance store. Upon being presented with a plethora of options he comes back with a cheap but energy inefficient refrigerator. Had he bought a slightly expensive but highly efficient refrigerator he would have ended up paying less money overall, due to reduced spending on energy usage over the life of the refrigerator. So, why didn't he buy the efficient variant? Herbert Simon would say that he worked under the constraints of 'bounded rationality'[1](Simon, 1955, 1979) and some other behavioralists would claim that he suffered from choice overload[2]. To put it more simply, as Thaler and Sunstein (2008) would say, he is a *Human* and not an *Econ*[3].

The point of above story is that people— like the customer above — are not perfectly *rational* all the time and behave *irrationally* when it comes to making decisions in their everyday lives. They are emotional, they procrastinate, they lack self-control, they value today differently from tomorrow, they care about others, they value loss more than gain, and behave in so many other ways which a perfectly

[1] Bounded rationality is the concept that rationality of individuals is limited by the information they possess, the cognitive limitations of their minds, and the limited amount of time they have to make a decision.

[2] It is found that when people are confronted with too many choices they tend to make no choice at all, even if they would be better off by making a choice. A popular example is provided by Iyengar and Lepper (2000). Customers at a grocery store when presented with a display of 6 jams to taste (12% bought jam) were more likely to buy jams against people who were presented with 24 jams (2% bought jam)(Iyengar & Lepper, 2000).

[3] Thaler and Sunstein (2008) in their book 'Nudge' classify people into two types - *Econs* and *Humans*. The former are the efficient and perfect calculators existing in economic theory, able to weigh multiple options, predict all the consequences of each, self-interested and choose rationally. The latter are ordinary people, like us, who are emotional, falter and are easily distracted and fall well short of its counterpart.

rational agent will not[4]. While price mechanisms (like subsidies, tax rebates and financial incentives) based on the conventional rational choice theory have guided much of the policy debate, behavioral anomalies or behavioral failures (Shogren & Taylor, 2008), like the ones above, have largely been ignored while formulating policies.

This is no less true for policies aimed at reducing residential energy use. Historically, adoption of energy efficient technologies has been sluggish and governments around the world have struggled in inducing people to go for energy efficiency. What could be the possible reasons for this? Rational choice theory and the price mechanisms based on it have not completely been able to solve the energy efficiency conundrum famously dubbed by Jaffe and Stavins (1994) as the 'energy-efficiency paradox'. This suggests that technology and price are not the only factors in the uptake of energy efficiency and here is where research into behavioral science can help to overcome the energy-efficiency gap by providing a solution to the last mile problem. Compelling evidence from behavioral interventions in various fields has shown the proof of concept that they can be utilized effectively to nudge people towards positive and environmentally responsible actions, also known as bridging the 'attitude-behavior gap' (the gap between the positive and favourable attitudes towards energy efficiency and less favourable behaviors) (Ehrhardt-Martinez, Laitner, & Keating, 2009). The promise that has been shown by behavioral research can be of paramount importance to India which is struggling to meet the energy needs of its people with around one-third of the total number of households are waiting to have access to electricity(Census, 2011).

Before the research community and other stakeholders in India jump onto the bandwagon of conducting and applying behavioral interventions to policymaking a carefully chalked out plan and prioritization is very important. This paper aims to draw attention to the need of exploring behavioral sciences to help push for energy efficiency and conservation and incorporating the knowledge from behavioral research to craft innovative and effective policy design and streamline the present policies to maximize the outputs in the Indian context. In this paper, we also lay down the various challenges that need to be overcome for the behavioral interventions to have the desired effect.

2. Why Behavioral Research in Energy Efficiency and Conservation?

Behavioral interventions into various domains, including energy efficiency and conservation, have been very powerful and have borne fruitful results. As stated earlier people are irrational and make decisions under the bounds of their rationality. The behavioral principles which explain the irrationality of people can be used to nudge them towards energy efficiency and conservation. These behavioral interventions are cost effective, can be easily implemented and produce substantial energy savings. Here, we review some examples of applied research, based on different behavioral principles, to illustrate the importance of behavioral research in energy efficiency and conservation and how these can influence policy by chalking out the obstacles and possible ways for overcoming them.

[4] For a comprehensive list of anomalous/irrational behaviors and behavioral principles please see Dellavigna (2009). See Houde and Todd (2011) for a list of behavioral principles that can inform energy use. Also see Wilson and Dowlatabadi (2007) for a review of energy decision making models.

Example1: Social norms

A large body of applied research shows that appealing to social norms can influence people's behavior. Peer Comparison is one of the methods that researchers have applied to change people's behaviors. It has been seen that people are more concerned about their levels of performance, well-being and possessions relative to others than absolute levels. Studies have shown that people adjust their behavior when provided with information about their performance or position relative to others. A recent study based on the work by the United States based company OPOWER shows that social norms can influence people to reduce energy consumption by a substantial amount in a very cost effective way when scaled to millions of households (Allcott & Mullainathan, 2010).OPOWER sends home energy-use reports to electricity and gas consumers that show the household's energy consumption, comparison with consumption of similar neighbours, and provide energy conservation tips. Data from natural randomized controlled trials with a huge sample size of around 600,000 households across the US show that the home-energy use reports have been responsible for reducing electricity consumption in the average household by over 2%(Allcott, 2011). The program costs the utility companies around 2.5 cents/kWh saved, which is a small amount compared to the savings from the program, thus making it quite cost effective. Evidence from a similar large scale field experiment on 75,000 households has shown that peer comparison can reduce energy consumption up to 2.1% (Ayres, Raseman, & Shih, 2009). In fewother pilot studies social references have shown to reduce energy and gas consumption by 20-28%. (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007).

Example2: Anchoring, default options and status quo bias

The second example is based on the behavioral principle called 'anchoring'. People make decisions and judgments based on an arbitrary value called the 'anchor' (Tversky & Kahneman, 1974). If an arbitrary number is provided to a person before making a decision or judgment then his answer is biased towards the direction of that number. A famous example is provided byTversky and Kahneman (1974). In an experiment, they asked people to guess the percentage of African countries in the United Nations. Students who were first asked "Was it more or less than 10%?" guessed lower values (25% on average) than those who were asked if it was more or less than 65% (45% on average). The study showed that their answers were influenced by the arbitrary number provided to them before making their guesses.

In energy efficiency domain,a2006 study found that energy consumption by washing machines was reduced by 24% when the default temperature was set to cold (McCalley, 2006).People used the default cold setting as the new anchor point and were less likely to readjust their settings to temperatures that deviated greatly from the default. This suggests that consumer behavior is influenced by anchor points or "default settings," demonstrating potential for substantial energy savings by modifying the factory default settings on appliances. Sticking to the default option is also seen as manifestation of 'status quo bias' in which people tend to go for the default option when presented with more than one choice(Samuelson & Zeckhauser, 1988). Also, as a default option, appliances can be set to turn off after

a certain time of inactivity. A 2010 study found that, in India the total standby[5] power consumption from the three appliances-televisions, set-top boxes and personal computers, was a whopping 2700 MUs in 2008(PEG, 2010).These numbers are predictive and give us a sense of the potential for savings. Substantial savings can be incurred if these appliances are set to turn off completely when they are not being used but are plugged into the circuit.

Making small modifications in default settings at the factory is an inexpensive and sustainable approach to encourage energy saving behavior by consumers. Appropriate anchor points on efficiency star labels might be influential (Wilson & Dowlatabadi, 2007). For example, setting up default temperature settings in star label refrigerators can be useful.

Example3: Goal setting, commitment and feedback

The third example is based on the impact of goal setting, commitment and feedback on energy savings. A large body of research show that people procrastinate i.e. we put off actions today that in the long run we know would be good for us. This is also reflected in the age old phrase -"tomorrow never comes". Economists call this phenomenon as dynamic inconsistency in which a decision-maker's preferences change over time in such a way that what is preferred at one point in time is inconsistent with what is preferred at another point in time. Goal setting entails that individuals or households set specific goals for reducing their energy consumption. Goal setting and commitment devices can help people to overcome procrastination and also provide a reference to work around. It was found that people reduced their electricity and gas consumption by 22% when they set specific reduction goals along with timely feedback on their performance (McCalley, 2006). Several other experimental studies have shown that commitments by people to save energy have resulted in up to 10% energy savings (Becker, 1978; Katzev & Johnson, 1983; Pallak, Cook, & Sullivan, 1980).

Significance and impact of voluntary commitment devices was also seen in the DSM utility driven program known as "*AkshyaPrakashYojana*" in the villages of Maharashtra, India. Under the scheme, a village could avoid load shedding in the evening by reducing the load voluntarily to 20% of the existing load. As a result of the scheme, the program villages received 21 hours of uninterrupted power supply free from planned load shedding and contributed to a demand reduction of 1260 MW(Sonavane & Vaishnav, 2008).

3. Issues with Behavioral Interventions

While behavioral interventions have shown powerful results across various fields, they have some limitations and issues which need to be addressed and resolved.

3.1.Is it fair to use behavioral research for policy?

This is the crux of the problem. Is the government being paternalistic by nudging people towards the so called 'good behaviors'? Some individuals may be of the opinion that using behavioral research related

[5] Standby power, also called "vampire power" or "leaking electricity", is the electricity consumed by appliances while they are switched off or are not performing their primary function.

to policy may be going towards the route of paternalism. While this point can be taken into account, many believe that policies which are not based on behavior or uninformed by scientific research are no less paternalistic and are likely to be less effective (Amir et al., 2005).

Another issue is with the use of default options, one of the most successful behavioral nudges. While it is considered as a positive push, it has its own shortcomings and is prone to manipulations and misuse. The important question here is - what is a good default option? The government may be subject to lobbying by appliance manufacturers to set a default that may result in their gains. Further, nudging people can not only cause people to change choices it can also affect the choice process. If people get good defaults as nudges, they will tend to stick to the default option if they see the benefits due to it. So, a person will be likely to choose a default option when he is making similar decisions in the future, even if the default is a 'bad one' or likely to have adverse effects. For example, companies may try to entice people by providing defaults with high gains in the beginning but can manipulate them later by deviously including malicious defaults later. Further, defaults can make a person dependent on them or make them 'spoiled' by hampering his thinking ability to make choice decisions when presented with a random situation. He might in such cases, just pick up the default option, even if he realizes that the default option is no longer the same. So, when policies are going to be based on the behavioral nudges future, changes to the policies and the effect it will have on people's choices should be carefully borne in mind (Haan & Linde, 2011).

3.2. Heterogeneous effects

Behavioral interventions should be grounded in proper and robust theory and need to consider the various variables which can have different effects on different target groups. This is very important because we might overlook the perverse behavior due to an intervention. For example, two different sets of people might demonstrate two different kinds of behavior, one of which might lead to undesirable outcome. To illustrate this effect, similar to the OPOWER study described above, a study was done by Costa and Kahn (2010) in which they studied the impact of home energy reports on people in the United States with different political ideologies and environmentalist values. They found that the energy consumption of Democratic households that pay for electricity from renewable sources, that donates to environmental groups, and that lives in a liberal neighborhood decreased by 3%. On the other hand, Republican households that do not pay for electricity from renewable sources and that do not donate to environmental groups increased their energy consumption by 1%.It is important that different aspects of behavior and personal dominant values of target audiences should be studied and considered before prescribing policy recommendations based on a behavioral intervention. Failure to do so will lead to an uninformed policy with dangerous and unanticipated perverse effects.

3.3. Are the impacts sustainable?

While there has been substantial literature on the impacts of behavioral nudges little research has been done on the sustainability of behavior change to curtail energy consumption. What will happen if after sometime fatigue sets in or the novelty of the nudge fades away and the person no longer reacts to the nudges in the same manner as before or reverts back to his original (pre-intervention) behavior? A

review of intervention studies aimed by household energy conservation by Abrahamse, Steg, Vlek, and Rothengatter (2005) found out that the long term impacts for most of the interventions were not measured and out of the few for which it was measured very few showed long lasting impacts. Greater research is required to measure the sustainability of behavioral interventions.

4. A Possible India Approach

Little research has been carried out in behavioral science to inform public policy in India, let alone behavioral research in energy efficiency and use. Fragmented efforts have been undertaken to exploit human behavior for energy efficiency and use. A private utility, Tata Power, recently launched a program called 'Club Enerji' in Mumbai which appeals to the behavioral principles of commitment and goal setting. In a different study, recently CUTS International carried out a nationwide survey to assess consumer behavior on energy efficient products in India(Chatterjee & Singh, 2012). Greater and more defined research by all sectors is the need of the hour. Here, we propose key recommendations to steer the direction of behavioral research in energy efficiency and conservation in India.

4.1 Need for nuanced research

Concerted and nuanced research is required to study behavioral factors in energy efficiency and conservation. Few key things should carefully be considered before anyone embarks to undertake behavioral experiments. Behavioral interventions should be grounded in proper theory. Randomized, controlled field experiments with a representative and adequate sample size must be carried out to ensure that the resulting impact is due to the behavioral interventions alone and not due to some other policy or program. Also, the results must be scalable and generalizable to a similar audience elsewhere. It is important that the impacts of the interventions be measured. This knowledge will help to make a decision whether it is worthwhile to carry out a full scale program or formulate a policy based on the results. Questions on behavioral aspects can also be included in large scale household surveys, like NSSO surveys, carried out by the government and other research agencies.

Further, it should be ensured that the dominant values, cultural attitudes and norms are considered while designing behavioral interventions. Most of the behavioral research in energy efficiency and conservation has been carried out in developed countries and very little has been done in India. (One of the aims of this paper is to create momentum for more research in behavioral science to inform public policy in energy efficiency and use). While behavioral interventions have had some impact in the developed countries, these interventions might not have the same impact in the Indian context. As there is a lot of heterogeneity across India and individuals are likely to have different dominant values and this needs to be kept in mind for the programs to be effective. It is crucial that greater research should be carried out to understand the behavior of people in India towards energy efficiency and conservation.

4.2 Impetus on energy efficiency

Behaviors related to reduction in household energy consumption can be classified into three types: curtailment , maintenance and efficiency behaviors (Olander & Thogersen, 1995). Curtailment behaviors entail repetitive efforts to reduce energy use, such as switching off appliances when not being used or lowering thermostat settings. Maintenance behaviors ensure that the household equipment is in good working condition, like having a car overhauled or central heating serviced. Efficiency behaviors are one-shot behaviors and involve the purchase of energy efficient equipment, such as energy efficient appliances or insulation. Most of the behavioral research on household energy reduction has been carried out in developed countries and these studies have mostly focused on the curtailment behaviors of people and very few on the efficiency behaviors. People in these countries are owners of high energy guzzling devices for heating and cooling which account for a greater percentage of the energy consumption. So, there is a large potential for energy reduction through curtailment behaviors. The case is different for India where a majority of the households own basic appliances like light bulbs, fans, televisions and refrigerators[6]. Out of these, refrigerator is the most energy guzzling appliance and only 18% of the Indian households own them (NSSO, 2010). Further, ownership of another energy guzzling appliance, air conditioner, is very low and that too is concentrated in high rich urban households. A mere comparison of the average per-capita household electricity consumption between India and United States gives us an idea. The average monthly electricity consumption by an Indian household is meager 57 KWh (NSSO, 2010) whereas its American counterpart consumes a staggering 958 KWh per month (EIA, 2012).

So, a greater impetus on behavioral nudges for diffusion of energy efficient technologies compared to curtailment behavioral nudges has a larger potential for energy reduction in the Indian context. A 2011 study byChunekar, Kadav, Singh, and Sant (2011) found that rapid market transformation to super-efficient variants of only four appliances – room air conditioners, refrigerators, television sets, and ceiling fans – has a potential of saving 60 million units of electricity in 2020. There can be great impact even if a small percentage of this market transformation is influenced by behavioral interventions. But, this does not mean that nudges for energy conservation should be ignored altogether. Behavioral interventions to curtail energy consumption could be carried out in large urban centers where there is seemingly greater conservation potential than the rest of India. Default energy saving settings for centralized air conditioners can be promoted in public establishments like business conference rooms and hotels.

4.3Implement smaller scale utility driven behavioral interventions

Studies have shown that people are more likely respond to utility sponsored programs due to their high levels of 'trustworthiness' (Stern, 1986). An evaluation study of the utility driven CFL program in Nashik, India found that utilities can greatly influence penetration of energy efficient technologies through carefully designed DSM schemes (Singh, Sant, & Kadam, 2007). Several utilities in the United States have

[6]See Rathi and Chunekar (forthcoming) for ownership patterns of fans, televisions and refrigerators in India.

utilized behavioral insights to improve their program effectiveness and capture new program savings[7]. Utilities can organize and run small and localized behavioral interventions involving local institutions and communities at the grassroots level. This can have a greater impact and a higher chance of success than running a full scale national level intervention. It will also be easier to understand the contextual factors and behaviors related to a particular community which can be harnessed effectively to run a full time program later. For example, utilities can send simplified electricity bills and see how much impact it has on energy savings. In communication, simple, vivid, salient, and personally relevant information is likely to have a greater impact than detailed, technical, and factual information(Stern, 1986; Wilson & Dowlatabadi, 2007). Another intervention could be in terms of reducing the upfront costs of energy efficient appliances and deduct the incremental cost from electricity bills. This will take care of the fact that people undervalue long term future benefits and overvalue long term costs while making purchase decisions. Utilities can also initiate a mobile phone message service under which the consumer will receive a feedback message on his phone every time a consumer exceeds his predetermined (committed) electricity usage.

4.4 Role of the Bureau of Energy Efficiency

Government can provide conducive and fertile grounds to explore the area of behavioral research by initiating things in its own backyard. The Bureau of Energy Efficiency (BEE) should carefully consider the behavioral factors in its information disclosure norms, such as energy efficiency ratings for appliances and fuel efficiency ratings for vehicles. For example, a 2008 research study shows that consumers can be misled by the fuel economy ratings in miles per gallon (mpg) as most people see mpg as a linear indicator of fuel costs, whereas, annual fuel costs behave non-linearly in mpg(Larrick & Soll, 2008). It means that people tend to underestimate the value of removing the most inefficient cars. In short, although mpg will tell us which car is most efficient, it clouds the value of improvements as fuel efficiency improves. The result is that people tend to undervalue small mpg improvements on inefficient cars, and overvalue large jumps between efficient cars[8].For example, to an average consumer the difference in fuel consumption by two cars with mileages of 10 mpg and 11 mpg may seem very small as compared to the difference in fuel consumption by cars with mileages of 25 mpg and 30 mpg. Research shows that buyers do tend to ignore such small differences and end up buying car with 10 mpg. However, simple calculations show that the amount of fuel saved over 1000 miles in both the cases (10 mpg to 11 mpg and 25 mpg to 30 mpg) is the same. This can be made clear by expressing the labels in gallons per mile (gpm)(Larrick & Soll, 2008). Recently the Indian government cleared fuel mileage standards and labeling for new cars.BEE can explore if it is going to be beneficial if labeling were going to be expressed in liters per kilometer (l/km) instead of kmpl similar to the mpg case. BEE can also look at evaluating the existing policies from a behavioral standpoint. For example, is the policy of using too many efficiency star labels[9] hampering the chances of uptake of energy efficient appliances because the

[7] See (Ashby, Nevius, Walton, & Ceniceros, 2010) for a comprehensive coverage of the various DSM programs in the United States using behavioral insights.
[8] To know more about this phenomenon visit www.mpgillusion.com
[9] At present, electrical appliances have 5 different efficiency Star ratings.

consumers are suffering from choice overload? Answers to such crucial questions are required to facilitate the penetration of energy efficient appliances.

4.5 Not a magic potion

The knowledge from behavioral research can provide valuable insights on how individuals and households make energy related decisions. These insights can be used to increase effectiveness of traditional economic interventions in energy efficiency and conservation. However, it is crucial that behavioral interventions do not 'crowd out' more effective traditional interventions (Loewenstein & Ubel, 2010). Research on behavioral aspects should complement, not substitute for, more substantive economic interventions, such as those based on influencing energy pricing (e.g. through taxation) or energy investment (e.g. through subsidy schemes) (Loewenstein & Ubel, 2010; Pollitt & Shaorshadze, 2012).Incentives and behavioral interventions are going to have a positive interaction effect, and the joint effect of combining them is often bigger than the sum of each intervention on its own (Stern, 2000).

4.6 Collaboration and partnerships

Meaningful collaborations and partnerships between researchers, academia, private sector, marketing professionals, NGOs and the government are needed to explore the field of behavioral sciences into policy making. Rigorous iterative design, testing and refinement of behavioral interventions should be carried out to understand what works and what not, and for whom and otherwise. Greater multidisciplinary research is needed to break out of the 'working in silos' mold and provide a greater holistic view.

5. Conclusion

Recent advancements in behavioral research have spurred a lot of interest in its application in the field of energy efficiency and conservation. Cost effective behavioral interventions have shown to induce energy consumers to take positive steps towards reducing energy consumption. This paper endeavoured to spark interest amongst researchers, policymakers, utilities, appliance manufacturers and other stakeholders to organize and undertake concerted research in behavioral interventions in energy efficiency and conservation in India. The knowledge from behavioral research can be useful in designing effective policies that can help reduce the energy efficiency gap. Further, while it is important that behavioral interventions should be explored to improve energy efficiency and conservation, it is by no means should be considered a panacea for the energy efficiency problem. It should complement, and not substitute the traditional economic interventions.

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