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An Inventory of Examples in Behavioural Economics which are Relevant for Environmental Policy Design

Paris, 19-20 November 2012

This document is a contribution to the OECD Project on "Behavioural Economics and Environmental Policy Design". It provides succinct, one-page summaries of the intervention studies analyzed to date, with an emphasis throughout on how the results are relevant for environmental policy. It also describes a potential framework for expanding this collection of examples into an online searchable inventory. It has been prepared by Laura Vong (formerly OECD Secretariat and Université de Nantes) and overseen by Zachary Brown (OECD Secretariat).

2011-12 PWB Item: 2.3.4.3.1 "Managing the Transition in Environmental Policy Reform"

Action Required: For discussion and agreement. Delegates are invited to comment on the proposal to develop a searchable database of policy-relevant examples, based on the material presented in the document.

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AN INVENTORY OF EXAMPLES IN BEHAVIORAL ECONOMICS THAT ARE RELEVANT FOR ENVIRONMENTAL POLICY DESIGN

Introduction

1. During discussion of ENV/EPOC/WPIEEP(2011)18 "Understanding Attitudes to Policy Measures and Barriers to Policy Implementation" at the November 2011 meeting of WPIEEP, the Secretariat was requested to compile a collection of examples of research in behavioural economics which are applicable to improving the design of environmental policies. This document reports progress on that task, and presents the summaries of 27 studies (26 intervention studies and 1 meta-analysis) that have been reviewed to date. This work is part of a broader effort of a project that seeks to identify areas where behavioural economics can have the greatest impact on environmental policy design (see ENV/EPOC/WPIEEP(2011)18, ENV/EPOC/WPIEEP/RD(2012)2 and ENV/EPOC/WPIEEP(2012)20.

2. This document provides short, one-page summaries of the intervention studies analyzed to date, with an emphasis throughout on how the results are relevant for environmental policy. We discuss in the next section of this report how behavioural economics can be used to enhance the cost-effectiveness of environmental policy, citing some of the studies in the inventory at the end. This report then discusses one "study of studies" by Osbaldiston and Schott.[1] This meta-analysis of 292 experiments evaluates the effectiveness of different interventions to increase pro-environmental behaviours. The study focuses on psychology experiments and does not explicitly address behavioural economics. However, psychology-based interventions are often quite cost-effective, as illustrated below, and there is significant overlap between psychology and economics in this area. For example, psychologists and economists have both examined in detail the use of "social comparison" interventions for increasing household energy and water savings.

3. The report then summarises a proposed framework for building an online database of studies on this topic. This would serve a similar function to that of the Environmental Valuation Reference Inventory (EVRI) database jointly managed by Environment Ministries of the United Kingdom, France, Canada, United States, Australia and New Zealand (https://www.evri.ca). The Secretariat would promote it at relevant conferences in order to ensure that the database is 'populated' with relevant field trials by policy researchers. If delegates approve of such an inventory in principle, then the Secretariat's next step will be to draft a document which would develop the technical details of such an inventory (*e.g.* type of web platform, means of dissemination, etc)

4. Following this, the majority of this report presents succinct summaries of 26 individual studies reviewed to date. These have been prepared following a uniform format in order to allow for ease of comparison. The concluding section of each summary focuses on the policy implications.

[1] Osbaldiston, R. and J.P. Schott (2012), "Environmental Sustainability and Behavioral Science", *Environment and Behavior*, Vol. 44, No. 2, Pages 257-299.

Behavioural economics in environmental policy: A question of cost-effectiveness

5. The primary motivation for analyzing behavioural economics in a public policy context is the prospect of making policies more cost-effective. These efficiency gains can be realized in two ways . First, behavioural economics can help better predict the impacts of traditional incentive-based policies, and provide a framework for identifying aspects of traditional policies that could be improved. Second, behavioural economics offers entirely new types of interventions, often based in psychology, which have not been traditionally considered by economists and might complement traditional environmental policy instruments.

6. Behavioural economics research can improve design of traditional, incentive-based policies by revealing where agents may not behave in a way predicted by mainstream economic models. Typically, incentive-based policy focuses on establishing clearly defined property rights structures for environmental goods, often through the use of permit trading systems and Pigouvian taxes/subsidies. Such policies aim to get the incentives 'right' and then to let the market 'work'. However, the performance of these institutions can be affected by systematic behavioural biases and non-selfish preferences, as a number of empirical studies have shown. Two examples are provided in the inventory below: France's "Bonus-Malus" system of subsidies and taxes for low-emissions vehicles was supposed to be revenue-neutral for the government, and yet it turned out costing the government around €225 million through higher-than-predicted sales of subsidized, low-emission vehicles. Possible asymmetric behavioral responses to taxes versus subsidies (*i.e.* discontinuous changes in the price elasticity of demand) are worthy of study – if possible through pilot testing – *before* rolling out major economic incentive systems. As another example, in Switzerland, it was found that local residents in a number of communities were much less willing to accept the construction of a nuclear waste facility near their homes when monetary compensation amounting to around USD 5 000 was offered, exactly the opposite of what basic economics would predict. Fortunately, in this case, the study was done prior to holding an actual referendum on siting the facility, so that policy could account for this unanticipated response pattern.

7. Behavioural economics has also produced powerful new policy tools, many of them deeply rooted in experimental psychology. By appealing to – or, as psychologists say, "activating" – social norms and pro-environmental attitudes, an array of such interventions can "nudge" agents towards more socially desirable behaviour,[2] without necessarily using costly subsidies or politically unpalatable taxes. A whole range of these psychology-based interventions are described in the following section of this report, but the one most studied by economists and public policy experts has been the use of "social comparisons". In a social comparison, an individual's behaviour is framed against how others in that person's peer group behave. A social comparison aimed at reducing household waste might read: "Last month, your household generated more mixed waste than 63% of your neighbours". Two notable examples of social comparison interventions evaluated by economists are provided in the inventory at the end of this report, one by Allcott and Mullainathan (2010) relating to household energy saving and another by Ferarro *et al.* (2011) relating to water saving. As both of these studies demonstrate, scientific evaluation has established social comparison interventions to be effective. Most importantly, they are cost-effective: their effects, while often modest, are achieved at extremely low cost when compared to technological, supply-side approaches to increasing resource efficiency. From a psychologist's point of view, however, social comparisons are just one among many possible interventions that can produce behavioural change through non-punitive

[2] By "socially desirable" this reports means "welfare improving," in the economic sense. However, it must be noted that behavioural economics calls into question much of the theory underlying the use of standard welfare metrics in economics. Indeed, how methods in welfare measurement may need to evolve in response to a growing body of countervailing behavioural economics research is an interesting topic of study in itself, but one which is not the focus of this report.

means. As discussed in the next section, some of these other interventions – such as activating cognitive dissonance – may be even more effective than social comparisons.

Summary of a meta-analysis of behavioural interventions to improve pro-environmental behaviours

8. The meta-analysis by Osbaldiston and Schott[1] evaluates a number of different behavioural/psychological interventions targeting environmental behaviours, and attempts to rank these interventions according to their impacts. Because the individual experiments analyzed by Osbaldiston and Schott use a range of different methods and calculate impact differently, the authors calculate a generalized statistical measure of impact for each experiment; the reader can look at the referenced study for details on the calculation. Overall, 10 types of interventions were analyzed. We list and describe these interventions here briefly, because they also happen to encompass many of the interventions described in the 26 studies summarized below. These 10 interventions are presented in order of how effective the meta-analysis determined them to be, starting from the most effective and proceeding to the least effective:

i. *Cognitive dissonance:* Such an intervention illustrates where there may be gaps between an individual's intentions and actual behaviour. Evidence and theory suggest that people have an aversion to observing that their own behaviour is inconsistent with their beliefs, and therefore will often correct their behaviour to better reflect their beliefs (revision of beliefs is also possible). For example, an intervention could point out when somebody declares being "extremely concerned with environmental problems" but also happens to exclusively drink bottled water instead of tap water. Under the right conditions, pointing this inconsistency out to the individual can change behaviour.

ii. *Goal setting:* Such an intervention assists people in setting goals about their future behaviour. Evidence suggests that such goal-setting can induce significant motivation, and recent research has suggested that more stringent goals are generally more effective.

iii. *Social modelling:* In such an intervention, a "role model" demonstrates the behaviour to the targeted individuals.

iv. *Prompts:* Non-informational reminders to engage in a particular behaviour, *e.g.* "Don't forget to turn out the lights!"

v. *Making it easy:* Any type of intervention that is focused on making a given behaviour more convenient—*e.g.* making recycling bins more accessible, or providing additional places to store one's bicycle.

vi. *Rewards:* This is where the standard tools of economists – pecuniary incentives – fall. It consists of any intervention which seeks to induce behaviour change by providing material rewards for the desired behaviour. It is important to note that the ranking of effectiveness here is in terms of estimated individual impact, not in terms of policy effectiveness, so we cannot infer that the previous 5 interventions are superior to incentive-based instruments. Furthermore, the authors of the meta-analysis—being psychologists—did not analyze key attributes of incentive-based instruments that economists emphasise, such as the magnitude of the incentive and the socioeconomic profile of the targeted individual.

vii. *Justifications:* Interventions providing the reason for engaging in a given behaviour, *e.g.* using less energy to reduce air pollution and slow global warming.

viii. *Commitment:* This type of intervention asks individuals to make an up-front commitment to changing their behaviour, *e.g.* by signing a pledge card to "be more sustainable" or to "re-use their towels." Note that the commitment is usually not as specific as setting a goal (*e.g.* reducing water use by 20%).

ix. *Instructions:* This intervention provides information on how to accomplish a desired, pro-environmental objective—for example, explaining that you can reduce energy consumption in your home by switching to compact fluorescent light bulbs (CFLs).

x. *Feedback:* This consists of simply providing feedback to individuals about their behaviour and hoping they modify their behaviour accordingly, *e.g.* showing households how much water they used in the past month as compared to their own historical average, or giving households feedback on how much money they saved through different actions like purchasing efficient appliances.

9. In addition to calculating the relative impacts of these different interventions, Osbaldiston and Schott also were able to examine the effect of undertaking some interventions in combination (this was due to the fact that many of the experiments utilized multiple interventions alone and in combination). For example, they found evidence that goal setting is much more effective when combined with a reward.

10. It also should be mentioned that Osbaldiston and Schott provide the first systematic comparison of these interventions that we are aware of. However, the data are still quite sparse, and the authors had to make a number of assumptions in their analysis. For example, the researchers had to make assumptions about what constituted the primary, secondary, tertiary, etc… interventions in experiments that used multiple interventions (which was most of those considered). Therefore, readers should interpret the above ranking as preliminary evidence that future work, such as the inventory proposed here, will build on.

11. Finally, it should be recognized that there is other research in behavioural economics that does not involve any of the interventions described above, and which is still quite relevant for environmental policy design. One example is research into how cooperative behaviour can emerge in groups seeking to provide a public good (where there is the threat of free riders) or effectively manage a common-pool resource (where there is a threat of over-exploitation). This kind of finding runs counter to traditional economic theory. Two of the studies summarized below (Rustagi 2010 and Frey 2000) demonstrate these concepts, and how institutions can emerge within groups in order enforce cooperative, welfare-maximizing outcomes.

A policy-oriented framework for organizing behavioural economics research

12. As the meta-analysis discussed above demonstrates, analysis of interventions targeting environmental behaviours often do not measure quantities, such as the intervention costs and duration of effects, which would be important for translating academic research into policy. They often focus on abstract concepts and rarely report information about the costs of interventions or the long-run persistence of their impacts. Nor do academic studies typically consider the potential for scaling up these interventions to a larger population.

13. This paper proposes a framework to organize relevant behavioural economics studies in a way that can be most useful for practitioners and policymakers considering behavioural interventions as an adjunct to policy instruments. The overall objective of this framework is to facilitate the search and identification of studies most relevant for a given policy question. For example, the framework would help a policymaker to answer the following question: *where were catalogued studies of cognitive dissonance*

conducted—can a policymaker expect to achieve comparable impacts if we replicate the intervention elsewhere? How cost-effective is Intervention Type X relative to Type Y?

14. As a starting point, studies can be categorised according to their context (place, time), policy domain (*e.g.* energy/water conservation, etc) and according to the type of interventions they analyze (*e.g.* social comparison, cooperation, etc.). There are also a number of attributes concerning how a given intervention was evaluated that can be important in interpreting the validity of the results (randomized controlled trial, natural experiment, etc.). Finally, of most importance are the outcomes of the interventions – both the behavioural impacts and the economic outcomes (i.e. costs) of the interventions. Box 1 provides more details on a possible framework.

15. As follow-up work we propose the development of a periodically updated inventory of examples of where has behavioural economics has been applied to environmental policy, or closely related areas. Such an inventory would categorize each example (including those described in this document) according to the attributes listed in Box 1. It is envisioned that this inventory would be populated by examples submitted by government officials and other experts, thus minimizing the direct resource implications for the OECD Secretariat. At this WPIEEP meeting, we therefore seek delegates' opinions on the value of such a resource, and approval in principle of the concept of establishing such an inventory, based on the material presented here. If the concept is approved, a document will be prepared for the next WPIEEP meeting to assess the technical requirements and long-term feasibility of establishing such an inventory.

Box 1. List of proposed tags for the inventory

- Context:
  - Place (city, country)
  - Time
  - Organization
  - Public/Private
- Intervention type:
  - Environmental issue (home energy, water, waste, transport, food)
  - Environmental policy instrument, if any (tax credit, information provision, etc.)
  - Economic / behavioural / psychological phenomenon (social comparison, goal-setting, cognitive dissonance)
- Evaluation attributes:
  - Relevant population
  - Sample size & methodology (pure random / stratified / clustered, convenience)
  - Control group?
  - Treatment selection (randomly assigned? Yes/no?)
  - Before/after intervention?
  - Evaluated persistence of effects?
  - Evaluated / accounted for subject heterogeneity?
  - Evaluated cost-effectiveness?
- Evaluation metrics:
  - Units of measurement (*e.g.* percent energy savings per household, gallons of water, etc)
  - Estimated impact
  - Statistical significance
  - Intervention costs
- Publication type:
  - Peer-reviewed journal article, government/consultancy report, unpublished, etc.

INVENTORY OF SELECTED STUDIES, BY POLICY DOMAIN

Energy and water

Allcott, A. and S. Mullainathan (2010), "Behavior and Energy Policy", *Science*, 327: 1204-1205.

Baca-Motes, K., Brown, A., Gneezy, A., Keenan, E.A. and L.D. Nelson (2013), "Commitment and Behavior Change: Evidence From the Field", *Journal of Consumer Research* (forthcoming).

Becker, L.J. (1978), "Joint effect of feedback and goal setting on performance: a field study of residential energy conservation", *Journal of Applied Psychology*, Vol. 63, No.4, pp. 428-433.

ClimateSmart Home Service, Queensland, Australia. Initiated by Queensland Government Department of Environment and Research and delivered by Local Government Infrastructure Services.

Dannenberg, A., Sturm, B. and C. Vogt (2010), "Do equity preferences matter for climate negotiators? An experimental investigation", *Environmental and Resource Economics* 47:91-109.

Dickerson, C.A. (1992), "Using cognitive dissonance to encourage water conservation", *Journal of Applied Social Psychology*, Vol. 22, No. 11, pp. 841-854.

Durham Region (1997), "*Durham Region Outdoor Water Conservation Pilot Study*", Durham Region, Ontario, Canada.

Ferraro, P.J., Mirando, J. J., Price, M.K. (2011), "The persistence of treatment effects with norm-based policy instruments: evidence from a randomized environmental policy experiment", *American Economic Review: papers & proceedings* 2011: 318-322.

Frey, B.S. and F. Oberholzer-Gee (1997), "The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding-Out", *American Economic Review*, 87(4): 746-755.

Goldstein, N.J., Cialdini, R. B., Griskevicius, V. (2008), "A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels", *Journal of Consumer Research*, 35.

McCalley, L.T., Midden, C.J.H. (2002), "Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation", *Journal of Economic Psychology,* 23: 589–603.

Pichert, D., and K.V. Katsikopoulos (2008), 'Green' Defaults: Information presentation and pro environmental behaviour", *Journal of Environmental Psychology* 28(1): 63-73.

Land and natural resource conservation

Alpizar, F., Carlsson, F. and O. Johansson-Stenman (2008), "Anonymity, reciprocity, and conformity: Evidence from voluntary contributions to a national park in Costa Rica", *Journal of Public Economics*, Vol. 92, pp. 1047-1060.

Rustagi, D., Engel, S., Kosfeld, M. (2010), "Conditional cooperation and costly monitoring explain success in forest commons management", *Science* 130(12), pp. 961-965.

Transportation

Bartle, C., Avineri, E. and K. Chatterjee (2011), "Information-sharing, community-building and trust: a case study amongst commuter cyclists", in: The 43rd Annual UTSG (the Universities' Transport Study Group) Conference, Milton Keynes, UK. Working paper.

Durrmeyer I., Février P., D'Haultfoeuille X. (2011), "Le coût du bonus/malus écologique : que pouvait-on prédire?", *Revue Économique*, 62(3), pp. 491-500.

Erikson, L., Garvill, J., Nordlund A.M. (2008), "Interrupting habitual car use: the importance of car habit strength and moral motivation for personal car use reduction", *Transportation Research,* Part F: Traffic Psychology and Behaviour, 11(1): 10-23.

Verplanken, B., Walker, I., Davis, A., Jurasek, M. (2008), "Context change and travel mode choice: combining the habit discontinuity and self-activation hypotheses", *Journal of Environmental Psychology* 28, pp.121-127.

Multiple environmental policy domains

Staats, H., Harland, P. and H.A.M. Wilke (2004), "Effecting durable change. A team approach to improve environmental behavior in the household", *Environment and Behavior*, 36(3): 341-367.

Non-environmental, but with implications for environmental policy

Buck, S., Alwang, J. (2011), "Agricultural extension, trust, and learning: results from economic experiments in Ecuador", *Agricultural Economics* 42 pp.685-699.

Duflo, E., Kremer, M., Robinson, J. (2011), "Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya", *American Economic Review*, 101: 2350-2390.

Ekström, M., (forthcoming), "Do watching eyes affect charitable giving? Evidence from a field experiment", *Experimental Economics*.

Fehr, E. and S. Gächter (2000), "Cooperation and punishment in public goods experiments", *American Economic Review* 90(4): 980-994.

Gneezy, U. and A. Rustichini (2000), "A Fine is a Price", *Journal of Legal Studies,* 29(1): 1-17.

Johnson, E.J. and D. Goldstein (2003), "Do defaults save lives?", *Science*, 302, pp. 1338-1339.

Saffer, H., Dave, D., Grossman, M. (2012), "Behavioural economics and the demand for alcohol: results from the NLSY97", NBER Working Papers 18180.

SUMMARIES OF SELECTED STUDIES

Peer comparison and energy saving

Allcott, A. and S. Mullainathan (2010), "Behavior and Energy Policy", Science, 327: 1204-1205.

Research question

16. Can providing regular "social comparisons" to households about their home electricity use relative to their peers prove to be a cost-effective instrument for saving energy?

Experiment

17. Over 100,000 households in the US were randomly selected from a database of electric utility customers to receive periodic reports which compared their energy use with their neighbour's. Each report contained: (1) a current period neighbor comparison (*e.g.* you used more energy this month than 45% of your neighbor's."), and (2) a twelve-month neighbor comparison, a personal historical comparison, and (3) targeted energy efficiency advice (*i.e.* information).

Results

18. The social comparison letters decreased household energy use by an average of 2.7% at a cost of 7.50 USD per household per year, implying a cost-effectiveness ratio of 0.025 USD per kWh saved – lower than many other energy efficiency investments. The net value of the intervention, including the benefits of carbon abatement, was estimated to be approximately 2,220 million USD per year.

Implications for environmental policy

19. This study is one of the key examples of how psychology-based environmental interventions, such as social comparisons, can be a cost-effective means of achieving environmental objectives and increased resource productivity. Of course, the absolute impacts of the interventions are quite modest (2.7% reduction in electricity use), so further work is required to see whether similar interventions can achieve greater impacts. There is also the question of whether the effects of this intervention persist (*i.e.* does the effect of the letters decay over time?).

Changing individual behaviours by encouraging commitment

Baca-Motes, K., Brown, A., Gneezy, A., Keenan, E.A. and L.D. Nelson (2013), "Commitment and Behavior Change: Evidence From the Field", Journal of Consumer Research (forthcoming). Summary available at: http://www.sciencedaily.com/releases/2012/09/120911125334.htm

Research question

20. How effective are commitment devices at increasing the adoption of pro-environmental behaviours?

Experiment

21. Instead of asking hotel guests to do their part in environment protection and adopt pro-environmental behaviours, they were asked to make a general commitment (adopt sustainable behaviours) or a specific commitment (*e.g.* reusing towels during their stay). In exchange for their commitment, some subjects were offered a "Friend of the Earth" pin. This experiment evaluates to what extent different types of commitment could encourage pro-environmental behaviour. (The composition of the subject sample was not described in the current provisional article outlining the study.)

Results

22. The specific commitment increased the frequency that individuals engaged in the targeted behaviour (reusing towels). However, when they made a general commitment to practice sustainable behaviour and received a pin to symbolize that commitment, the effects spilled over into other behaviours, such as turning off lights.

Implications for environmental policy

23. Encouraging people to commit to pro-environmental behaviours could be more efficient than telling people what they should do. Other ways to induce desired behaviours could be considered when it appears to be more appealing for people. Further studies should be conducted to evaluate how persistent the effects of declared commitments are, and what the cost-effectiveness of these interventions can be relative to other behavioural interventions of the type covered in this inventory.

Joint effect of feedback and goal setting on residential energy conservation

Becker, L.J. (1978), "Joint effect of feedback and goal setting on performance: a field study of residential energy conservation", Journal of Applied Psychology, Vol. 63, No.4, pp. 428-433.

Research question

24. Does the presence of a difficult goal combined with energy consumption feedback encourage energy conservation?

Experiment

25. Homeowners were asked to participate in a study of energy consumption. Participants were then assigned to either a difficult goal for energy savings (20% reduction) or an easy one (2% reduction). Half of subjects in each treatment group were randomly selected to also receive consumption feedback. This permitted the evaluation of (externally-imposed) goal-setting independently and in combination with a feedback intervention.

Results

26. The results show that the highest (and only statistically significant) effect was found when feedback and difficult goal-setting were jointly used. This evidence implies that feedback is necessary for goal-setting energy conservation interventions to have any impact.

Implications for environmental policy

27. Goal-setting can be a relatively cheap type of intervention to encourage energy saving. Moreover, the marginal cost of increasing the stringency of the goal is almost zero. Thus, more difficult goal-setting will almost always be more cost-effective if such an intervention is to be undertaken – as long as the goal is perceived as achievable by the individuals challenged to meet the goal. However, goal-setting without providing feedback was not found to be effective in this study. Cost-effectiveness (and persistence of impacts) of the joint intervention – goal-setting plus feedback – therefore needs to be further analyzed for its suitability as a policy tool.

Customized plans and goal-setting to reduce energy use

ClimateSmart Home Service, Queensland, Australia. Initiated by Queensland Government Department of Environment and Research and delivered by Local Government Infrastructure Services (LGIS). Available at: http://www.toolsofchange.com/en/case-studies/detail/637

Research question

28. Can goal-setting, combined with information provision and market-segmentation, be an effective intervention to reduce household energy use?

Experiment

29. 260,000 residents of Queensland (Australia) had the opportunity to sign up for the 'ClimateSmart Home Service' and thus get an energy audit which included information on energy-efficient product labels, small equipment (*e.g.* efficient light bulbs), mental prompts and recommendations. Six weeks after the audit, they received a customized plan to reduce energy use. Using statistical techniques often used in marketing research, the participants were classified between *early adopter*, *early majority*, *late majority* and *laggards*. To ease behavioral adaptation, a voluntary personal energy challenge, wireless power monitors and an on-line portal were provided. Motivational communication materials were also sent to motivate the residents to reach their target. Note that there is no mention of a controlled, randomly assigned experimental design.

Results

30. Because no control or random assignment between treatments was reported, the impacts of the program should be considered skeptically, particularly the behavioral responses to the interventions. Program projections report that the intervention will have reduced electricity use by more than 1395kWh/household. More importantly, no quantitative impacts are reported regarding the performance of the goal-setting / personal communication interventions relative to the interventions that relied only on information and technology. However, some qualitative results are reported: additional information and energy-saving materials were most effective among those consumers classified as *early adopters*, whereas these resources were not effective among *laggards* unless accompanied with a personalized energy savings plan and goal-setting energy challenge.

Implications for environmental policy

31. This study reports observational evidence that suggests (a) goal-setting can be an effective energy-saving intervention and (b) classifying consumers by their attitudes and behaviour can be a useful way of determining where to focus goal-setting efforts. Point (a) agrees with other rigorous studies demonstrate the effectiveness of goal-setting. On point (b), many have proposed using segmentation analysis for targeting resources (ads, products, policies) at receptive individuals. Yet this is one of the few cases in environmental policy demonstrating such an approach.

Equity preferences for climate treaty negotiators

Dannenberg, A., Sturm, B. and C. Vogt (2010), "Do equity preferences matter for climate negotiators? An experimental investigation", Environmental and Resource Economics 47:91-109.

Research question

32. Do climate negotiators have preferences for equity? How much does equity matter for negotiators involved in international climate policy?

Experiment

33. Two non-strategic games were conducted with professionals who worked on issues related to international climate policy. This experiment measured inequality aversion in two cases, with different aggregate payouts (*i.e.* sum of individual payouts): (A) when more equal distributions involved no change or decreases in the overall payout (*disadvantageous equality*), and (B) when the more equal distribution coincides with a greater aggregate payout (*advantageous equality*).

34. Game A measured aversion to disadvantageous inequality, i.e. the distribution of a fixed amount. It consists of 22 choice tasks in which person 1 has to decide a pair of payoffs for him and another subject (person 2). She has the choice between pair 1, which is an unequal distribution of $200 (starting at $100 for each and decreasing person 1's payoff until reaching $2), and pair 2 which is an equal distribution with $40 for both.

35. Game B measured aversion to advantageous inequality, *i.e.* enhancing the public good at a cost to oneself. Person 1 has to choose between pair 1 – a private payoff of $200 and payoff to the other subject of $0 – and pair 2, consisting of an equal distribution starting at $0-$0 and ending at $210-$210 at the 22nd round.

36. In game A and B, participants were supposed to imagine that their decisions were to be made by a group of representatives of their country at a conference of the parties or a meeting of the subsidiary bodies.

Results

37. As rational and selfish decision-makers, we would expect negotiators to choose the pair with the highest payoff and switch when the payoff becomes to be more advantageous in the other pair. However, the participants appear to be averse to inequality and especially to advantageous inequality (that is, they are surprisingly willing to enhance the public good at a cost to oneself). Consequently, they will prefer to donate a part of their endowment to increase equity even if it will reduce their own interest. However, weak evidence was found for aversion to disadvantageous inequality (where the public good – the total payoff – does not increase with more equitable distributions).

38. With higher advantageous inequality aversion and lower disadvantageous inequality aversion, subjects will be more likely to cooperate in a public goods game and will avoid suboptimal outcomes. It is worth noting that subjects were aware of the divergence between individual preferences/behaviors and the collective outcomes of countries' policymakers. A majority of the participants expects their country to make rather selfish decisions, even though inequality aversion was observed among individuals.

Implications for environmental policy

39. A major question raised in this study – and which is not answered – is whether negotiators' personal preferences for equity, as captured in this experiment, affect their behaviors in international negotiations. A deeper question, which goes beyond the scope of environmental policy, is whether the outcomes of such negotiations reflect not only the policy objectives of national governments but also the private preferences of the negotiators.

40. While the study suggests that individuals have altruistic preferences for more equitable outcomes, the context of the experiment (imagining decisions being made by a group of representatives at a conference of parties) may have induced a purely rational preference for equity based on game-theoretic "tit-for-tat" strategies, i.e. "if you scratch my back, I'll scratch yours." Negotiators may choose equitable distributions of gains now, with the expectation that other countries' negotiators will reciprocate this generosity in the future.

Cognitive dissonance to encourage water conservation

Dickerson, C.A. (1992), "Using cognitive dissonance to encourage water conservation", Journal of Applied Social Psychology, Vol. 22, No. 11, pp. 841-854.

Research question

41. Can activating cognitive dissonance in individuals—by calling attention to gaps between their intentions (*e.g.* desire to help the environment) and behaviour (*e.g.* taking long showers)—increase water conservation efforts?

Experiment

42. This experiment was conducted with a group of 80 female swimmers who were randomly assigned to 3 different conditions/interventions, plus a control group. In a "mindfulness" condition, subjects were shown whether or not they wasted water while showering. In a "public commitment" condition, subjects were asked to make a public commitment to water conservation. The last condition was a combination of the other two – in which subjects were asked to make a commitment after having their attention drawn to their water use behaviour. This last condition was designed to activate cognitive dissonance, by making people feel hypocritical if they made a public commitment but then wasted water. Water consumption, measured via shower length, was then evaluated for each of the 3 conditions and the control.

Results

43. Only the cognitive dissonance condition (mindfulness combined with public commitment) had a statistically significant impact (p-value = 0.04) on subject behaviour (*i.e.* length of shower). Relative to the control group, the cognitive dissonance group took 30% shorter showers on average.

Implications for environmental policy

44. Cognitive dissonance interventions like this have clear potential for increasing pro-social / pro-environmental behaviours, as this experiment and a number of others show. Moreover, there may be less of a moral dilemma for governments to intervene in this way because they assist individuals in matching their behaviour and intentions, as opposed to other behavioural interventions which aim to modify individuals' intentions (*e.g.* by actively framing policy alternatives). As with recent results regarding "social comparison" interventions (see the studies by Ferraro and Allcott in this inventory), outstanding policy questions for cognitive dissonance interventions are: (a) how persistent are the effects over a longer period of time (i.e. do the effects wear off)? And (b) can these interventions be expected to perform as effectively in other contexts (i.e. what is the external validity of these interventions)?

Information, commitment and water use efficiency

Durham Region (1997), "Durham Region Outdoor Water Conservation Pilot Study", Durham Region, Ontario, Canada: Water-efficient Durham available at: http://www.toolsofchange.com/en/case-studies/detail/156/

Research question

45. How cost-effective are information provision and public commitment interventions as a means to reduce water use?

Experiment

46. The Regional Municipality of Durham tried to urge neighbourhoods with high summer peak water use to change their consumption habits by providing information and by making people commit to a reduction plan. This change could avoid costly plant expansions for the region. The municipality aimed to convince people to water their lawns a maximum of one inch per week. Multiple rounds of the study were conducted, and we describe two of the rounds here. In the first round, the effects of information provision (about how to conserve water used for watering lawns) were evaluated relative to a control group of households. In the second round, the effects of information provision plus commitment (to reduce lawn watering by a fixed amount) were compared to a control group.

Results

47. Both treatments appeared to yield a 26% reduction in lawn watering. The commitment did not appear to produce any larger effect relative to the information-only treatment, but the experimental design did not allow this observation to be statistically tested (the pilot, information-only group was too small for a reliable comparison). Moreover, the fact that 82% of households signed the commitment forms when asked is certainly suggestive of the impact on water saving due to the commitment. Over the course of several rounds of the program, costs were driven down to around $45 per household, from an initial level of over $88 per household. Importantly for policy, the construction of an extension to the water plant in the community was avoided as a direct result of the program impacts.

Implications for environmental policy

48. This study is obviously relevant for improving household resource efficiency. Perhaps most importantly, it demonstrates a government (not academic researchers) taking an incremental, experimental approach to evaluating a policy in terms of its effectiveness and its costs, to see whether it is worth it to scale up. Such experimental approaches are important for rational policy evaluation, since uncontrolled evaluation can become biased by stakeholders who have a conflicting interest in seeing the policy succeed or fail.

Encouraging water saving by using non-financial incentives

Ferraro, P.J., Mirando, J. J., Price, M.K. (2011), "The persistence of treatment effects with norm-based policy instruments: evidence from a randomized environmental policy experiment", American Economic Review: papers & proceedings 2011: 318-322.

Research question

49. Are social comparisons effective for decreasing household water consumption, and how long do the impacts of these psychological tools last?

Experiment

50. A randomized controlled experiment was conducted among a set of communities in the southeastern United States. Three different non-price interventions for reducing water consumption were tested. The first intervention group was sent one-time letters containing information on how to reduce water use. The second group received the same information, but with an appeal to pro-social preferences asking them to save water (*e.g.* "every drop counts"). The last intervention group was the same as the third group (information and social norm), and in addition provided households with information about their water consumption relative to their neighborhood average (*e.g.* "last month you used more water than 67% of your neighbors").

Results

51. Even though people were fully aware of how to reduce water use, information provision did not have significant effects at all, and the weak social norm treatment (without social comparison) only had an impact in the short-run (for a couple of months). The largest and most persistent reductions in water use were found in the group sent a social comparison (including information and an appeal to social norms): The social comparison intervention reduced water consumption by an average of 2.6% over the first year following receipt of the letters, and still yielded a 1.3% reduction in consumption 1 year hence. These effects were found to be statistically significant.

Implications for environmental policy

52. Water consumption among high-use households tends to be especially difficult to reduce water, because high-use households – who are often the high-income households – also tend to be less sensitive to changes in water prices (indeed, where volumetric water charges are even available). Social comparisons, however, may provide an effective tool in settings where policy is constrained, *e.g.* where price-based instruments for water conservation are not politically palatable. Furthermore, non-price instruments like this may have an even greater relative impact among high-consumption/high-income households.

Nuclear waste and price incentives

Frey, B.S. and F. Oberholzer-Gee (1997), "The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding-Out", American Economic Review, 87(4): 746-755.

Research question

53. Can price incentives lead to a lower level of acceptance for installation of a nuclear waste facility than would be the case in the absence of such incentives?

Experiment

54. The research analyzed the willingness of Swiss residents to host a low- and mid-level radioactive waste facility in their communities. Via a referendum format, residents in a number of communities were asked whether or not they would be willing to accept the nuclear waste facilities to be constructed nearby. For a subset of the respondents, the same question was asked but with an additional compensation offer of between $2,175 to $4,350 (a one-time payment).

Results

55. Contrary to standard economic theory, respondents were less likely to accept the facility if compensation was offered. As an explanation for this finding, the researchers propose that people accept the siting of the facility nearby out of a feeling of civic duty[3] which was then "crowded out" when compensation was offered. In addition, perceived risk, the quality of the selection procedure, and general support for nuclear power were significant variables for the acceptance of the facility. The latter result can be viewed as inconsistent with standard theory as well – the benefits of nuclear power (e.g. versus coal power) are essentially a public good, whereas the risks of the nuclear waste facility are private, the costs borne by local inhabitants. This asymmetry leads to the classic "not-in-my-backyard" (NIMBY) phenomenon.

56. An alternative explanation for these research results is that respondents interpreted the compensation amount as an implicit indicator of project risk: A facility for which no compensation was offered may have been viewed as less risky than one in which significant compensation (thousands of dollars) was offered. However, further analysis by researchers indicated that people did not see the compensation as such (*i.e.* compensation did not affect perceived costs/risks of the facility).

Implications for environmental policy

57. Price incentives can "crowd out" civic duty and lead to a lower level of acceptance. For a project where "public-spiritedness" is already high, policymakers should consider non-price incentives which do not "crowd out" intrinsic motivations. This applies especially to NIMBY facilities which are socially desirable but costly/risky for those near the proposed facility. (For another example of moral "crowding out" of price incentives, see "A Fine is Price," which is summarized in this inventory.)

[3] For those who view nuclear power as socially desirable, which is of course not everyone.

Social norms and environmental conservation programs

Goldstein, N.J., Cialdini, R. B., Griskevicius, V. (2008), "A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels", Journal of Consumer Research, 35.

Research question

58. Does appealing to consumers' social norms effectively induce pro-environmental behaviours?

Experiment

59. A towel reuse program was implemented in a national hotel chain to encourage the guests to help environmental conservation. The experiment tried to improve this program in evaluating how different prompts would change guest behaviours (towel re-use). In total, guests in 190 rooms received either an industry-standard message (*e.g.* "Help save the environment!") or a descriptive norm message informing them about what the previous guests did (*e.g.* "The majority of guests in this hotel reuse their towels."). A follow up experiment evaluated more detailed social norms, similar to a weak social comparison: The description of "other guests" varied in terms of socioeconomic profile, and whether other guests were said to have stayed in the same room

Results

60. The social norm message increased towel reuse by 9%, and the effect was even larger when the appeal described "other guests" as being similar in terms of their socioeconomic profiles to the subjects, or had stayed in the same room as the subjects.

Implications for environmental policy

61. This study first illustrates that appeals to social norms (which are relatively cheap to implement) can have a measureable impact on pro-environmental behaviors. Furthermore, the study illustrates that these social appeals can be made more effective by reducing the "psychological distance" between the consumer and the reference group in the message (*e.g.* by comparing the consumer to others with similar socioeconomic profiles or who have been in similar situations – such as having stayed in the same hotel room).

Goal-plus-feedback to increase household energy saving

McCalley, L.T., Midden, C.J.H. (2002), "Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation", Journal of Economic Psychology, 23: 589–603.

Research questions

62. How does goal-setting work to achieve behavior modification – in this case energy savings? How does a self-determined goal perform, as compared to an externally imposed goal? Does response to goal-setting vary with subjects' level of pro-social behavior?

Experiment

63. This simulated experiment analyzing washing machine use was conducted with 100 subjects in the US. During the experiment, everyone was told that by reducing the temperature of their washing machine they could save 20% of energy used in washing. Three different treatments, plus a control group were analyzed: The first group (feedback-only) received only feedback on their consumption. The second group (self-goal) also received feedback and were asked to set their own energy-savings goal (*e.g.* 30% reduction in your average energy use per wash). The third group (assigned-goal) received feedback and were assigned an energy savings goal by the experimenter. People were also classified into two categories according to their degree of "pro-social" behavior, as measured by a psychological test.

Results

64. There was no difference in behavior between the control and feedback-only groups – *i.e.* feedback alone had no effect. Both goal-setting groups, however, saved about 20% more energy relative to the control group, with no significant difference in average energy savings between the self-goal and assigned-goal groups. Subjects revealed to be more pro-social based on the psychological test responded better to the assigned-goal treatment, as compared to setting their own energy savings goal.

Implications for environmental policy

65. This study is an example of how behavioural interventions can usefully complement traditional environmental policy instruments. By itself, providing feedback on energy use is likely to be ineffective at encouraging conservation, but can be highly effective when coupled with goal-setting. Furthermore, effectiveness of goal-setting can be improved by adapting the manner of goal-setting (self-imposed versus externally imposed) to an individual's pro-social orientation. This suggests that, where feedback is already being provided (*e.g.* the rollout of smart-meters currently underway in many countries), goal-setting interventions are likely to be cost-effective, and that – additionally – it may be worth it for governments to collect precise information on individuals' social attitudes to aid in adapting goal-setting to different attitudinal profiles.

Defaults to promote 'green' energy

Pichert, D., and K.V. Katsikopoulos (2008), "'Green' Defaults: Information presentation and pro environmental behaviour", Journal of Environmental Psychology 28(1): 63-73.

Research question

66. Is choice of electricity supplier influenced by the default option?

Experiment

67. Two natural and two laboratory experiments were conducted among the German general public (in 2 of the studies) and the student population (in 1 of the lab experiments) to better understand how people react to a reference point (or default). These experiments show how differently people behave when they were either offered a 'grey' (e.g. traditional coal-burning) electricity provider, a 'green' provider (i.e. decreased environmental impact, such as solar generation) or when they have the choice between the two of them. The experiment assessed how many households enrol in 'green' electricity depending upon which option is specified by default.

Results

68. While it might be assumed that for equal service cost and quality, people would tend to prefer the 'green' option, this is not reflected in their choice of electricity provider. When a 'grey' electricity tariff is proposed as a default, people do not usually switch from this reference point when a 'green' alternative is proposed. However, using the 'green' supply as a default significantly increases the number of household who choose this option: People are prone to accepting the initial state and do not switch readily to an alternative service. This is an innovative result because it suggests that people's choice of electricity supplier does not fully reflect their intrinsic preferences, and that these choices can be affected by seemingly small contextual factors.

Implications for environmental policy

69. These results can be interesting to better understand decision making. It is possible that people see defaults as an implicit recommendation by the service provider. Alternatively, they may remain with the default option because it would be 'cognitively costly' to do otherwise; this is in line with Daniel Kahneman's discussion in *Thinking Fast, Thinking Slow* of how humans are prone to making mental shortcuts to avoid 'effortful reasoning.' Irrespective of the motivation, however, 'green' defaults can serve as useful tools in some contexts for attaining environmental policy objectives more cost-effectively. To improve policy design, more research is needed on whether the effects of defaults persist over longer periods of time, and whether defaults can still significantly affect choices when the consequences can be costly to decision makers.

Contributions to a national park: impacts of anonymity, reciprocity and conformity

Alpizar, F., Carlsson, F. and O. Johansson-Stenman (2008), "Anonymity, reciprocity, and conformity: Evidence from voluntary contributions to a national park in Costa Rica", Journal of Public Economics, Vol. 92, pp. 1047-1060.

Research question

70. How can social reference points and norms about reciprocity increase voluntary contributions to public environmental goods such as national parks, and minimize free riding?

Experiment

71. This experiment concerns the contributions of tourists to a natural park (Poas) in Costa Rica. Professional interviewers randomly approached tourists as they left the park. Selected tourists were asked to participate in an interview and then to give a contribution. They were assigned to three different treatments: 1) anonymous contributions 2) offering a small gift to test reciprocity 3) use of a social reference point on others' contributions.

Results

72. According to conventional theory, if people are expected-utility maximizers, they would try to free ride and enjoy the benefits of the public good without paying anything. However, the study found that in fact tourists were willing to contribute a positive amount. One could argue this finding could be explained by some degree of satisfaction generated by giving money for public services (particularly protecting a jungle in Costa Rica). However, the study found that tourists' donations were affected by social reference points: When provided with such a reference point ("people generally give $10"), tourists tended to donate similar amounts. Anonymity was found top decrease contributions: People appear more generous when their contribution can be seen by someone else (even when they do not know that person). This study replicated a number of findings from laboratory-based economic experiments, but—interestingly—the contributions in the field setting were generally lower than those found in lab experiments.

Implications for environmental policy

73. Where it can be effective, showing what other people do and how much they contribute could increase the overall donations. It is important not to give a low reference point when people would contribute more without any recommendation. People generally care about social approval and want to be perceived as fair and "publicly-minded." Although incentive-based instruments are effective policies for reducing free-riding type market failures, where such instruments are not feasible, interventions which activate social norms and concerns about how one is perceived by others can be an effective means of generating support for public goods.

Increasing cooperation in forest commons management

Rustagi, D., Engel, S., Kosfeld, M. (2010), "Conditional cooperation and costly monitoring explain success in forest commons management", Science 130(12), pp. 961-965.

Research question

74. In the absence of formal property rights structures and institutions, how can overexploitation of common pool resources be avoided?

Experiment

75. The objective of this study was to investigate how the behaviors of 49 forest management cooperatives were affected by the share of "conditional cooperators" present within the group. The study authors define a "conditional cooperator" as someone who (a) contributes to a public good only when others do the same and (b) is willing to enforce cooperation by using costly monitoring and punishment. (In traditional economics, conditional cooperators should not arise, since free-riding is the optimal strategy of self-interested agents.) In the forest program where the experiment took place, groups were tasked with maintaining forest cover and requested to harvest a limited level of fuelwood (a common-pool resource). Whether they accomplished this objective was hypothesized to be in part a function of the internal group dynamics and degree of cooperation. A simulated economic game conducted with the experimental subjects enabled the researchers to classify subjects by their level of conditional cooperation and free-riding.

Results

76. Conditional cooperators were found to comprise over a third of the sample population. This, in itself, is interesting finding, as it contradicts conventional economic theory. Conditional cooperators are, by definition, more willing to enforce cooperative behavior, by monitoring free riders and punishing them for non-cooperative behavior even though there is no economically rational reason for them to do so (according to conventional theory). As a consequence, it was found that groups with a larger share of conditional cooperators were able to maintain higher forest cover: On average, one additional tree per hectare was associated with every 2% increase in a group's share of conditional cooperators.

Implications for environmental policy

77. Conventional economic prescriptions for common-pool resource management problems usually involve imposing formal property rights structures (*e.g.* individual transferable quotas). Yet alternative institutions have been emphasized in recent decades based on observations that some resource user groups have been able to successfully manage common-pool resources without formal property rights.[4] The study described here is important for policy because it illustrates a simple way of analyzing whether a group of resource users may successfully "self-police" behavior to yield sustainable behaviors, or whether the group requires external imposition of more formal property right structures.

[4] Elinor Ostrom, the 2009 Nobel laureate in the economic sciences, devoted much of her research career to the study of alternative institutions for managing common-pool resources.

Information-sharing amongst commuter cyclists

Bartle, C., Avineri, E. and K. Chatterjee (2011), "Information-sharing, community-building and trust: a case study amongst commuter cyclists", in: The 43rd Annual UTSG (the Universities' Transport Study Group) Conference, Milton Keynes, UK. Working paper.

Research question

78. Does the way of conveying information—commonly referred to as 'framing'—impact the degree of confidence in information, in the case of bicycle commuting?

Experiment

79. Twenty-three participants were recruited (nonrandomly) from the North Bristol (UK) area to test a web platform called Cycology which houses user-generated cycling information. Invited participants used an interactive map and posted comments and photographs about cycling routes, and participated in discussion boards about cycling. At first, their degree of cycling to work varied from everyday to occasionally.

Results

80. Information sharing among the participants served not only a functional role of improving participants' knowledge of cycling options, but also served to build social ties among participants, which reinforced positive attitudes towards cycling. As expected, the web platform lead to sharing of cycling experiences and knowledge. However, in addition, the platform fostered trust and cooperation among the participants. User-generated information based on real experiences and small-sized group interactions increased confidence and reliability, whereas people seemed to pay less attention to the official information about cycling. Finally, emotions, subjective opinions and social support participated in making people switch to cycling.

81. Some caveats associated with the case study methodology used in the research should be considered before extrapolating results. Most notably, the study does not include a comparison group (e.g. a group of commuters that was only given brochures about cycling paths in their community). To be confident in the results, an appropriate 'control' would be necessary to scientifically validate the effect of such a platform.

Implications for environmental policy

82. Web platforms may be effective tools for municipalities or local governments to encourage cycle-based commuting. The platforms may not only improve information-sharing, but also facilitate the formation of pro-environmental norms among participants. However, a controlled study is necessary to verify the implied impacts of these types of interventions. Furthermore, it would be necessary to quantify the expected magnitude of the impact of these web platforms to see whether their cost is justified in this context.

A French "bonus-malus" scheme for incentivizing low-emission vehicle purchases

Durrmeyer I., Février P., D'Haultfoeuille X. (2011), "Le coût du bonus/malus écologique : que pouvait-on prédire ? ", Revue Économique, 62(3), pp. 491-500.

Research question

83. How do people respond to economic incentives aimed at improving environmental quality?

Experiment

84. In 2008, France implemented a policy which taxed (malus) or credited (bonus) car purchase if the carbon emissions were above or below certain targets. Cars with CO_2 emissions below 130g/km could get a price cut between EUR 200-1000, whereas purchase of vehicles with emissions above 160g/km incurred a tax of between EUR 200-2600. This measure was supposed to be revenue-neutral for the government because the malus was expected to compensate the bonus.

Results

85. While it was predicted (based on traditional economic theory) that the impact of the tax incentives would be equivalent to a price change of the same magnitude, the impact of the taxes turned out to be 3 times higher than what would have been predicted based on an equivalent change in price. When the bonus-malus system was designed policy makers did not anticipate this phenomenon – that is, higher than expected purchases of cars with the bonus and lower than expected purchase of cars with the malus. This outcome, far from achieving revenue neutrality, turned out to be quite costly for the government (EUR 225 million). Potential explanations for this unanticipated behavior from households could have been due to advertising and information provision from high-efficiency carmakers, and to related changes in households' preferences.

Implication for environmental policies

86. Environmental policies are complicated to implement because they can generate significant changes in environmental preferences. The economic methods normally used to analyze incentive-based policies typically assume that agents (consumers, households, etc.) have preferences which do not change. This study clearly illustrates the importance of trying to evaluate potential changes in people's preferences that increase their willingness to pay for green products. *Ex ante* calculations of optimal incentive sizes therefore need to go beyond the effects of prices on behaviour, by examining the attitudinal impacts of different policies.

Strong car use habits and deliberate travel choices

Erikson, L., Garvill, J., Nordlund A.M. (2008), "Interrupting habitual car use: the importance of car habit strength and moral motivation for personal car use reduction", Transportation Research, Part F: Traffic Psychology and Behaviour, 11(1): 10-23.

Research question

87. How can an interruption in car use lead to more deliberate travel choices?

Experiment

88. This experiment aims at reducing car use through an intervention to break car use habits and encourage deliberate travel choices. Subjects (72 Swedish car-users) had to fill in a pre-intervention questionnaire concerning background characteristics, personal norms and the strength of their car-use habits. All subjects were asked to fill in a car diary containing all their car trips before any intervention. The next week, an intervention was conducted (with a control group and random assignment) in which an assistant made a home visit and asked subjects to complete a prospective plan on how they would deliberately reduce their car use, and discussed the possibilities to reduce car use with a change in travel behavior. The theory for this intervention was that by converting car-use from a habitual to a deliberate choice, it would be more susceptible to modification. Following this intervention, subjects were then asked to fill in another car-use diary in order to assess the impact, along with final questionnaire at the end of the study.

Results

89. Car use depends on contextual factors such as available alternatives and information but also individual characteristics (income, time). Habits generally make decisions inconsistent with people preferences and intentions. This study found that habit formation/deconstruction was an important mediator between norms and behavior. Though people felt morally obliged to reduce car use, there was no significant correlation between these feelings and their current car use at the beginning of the intervention. However, the intervention caused a significant increase in the correlation between personal norms and car use. Thus, in breaking car use habit and making people plan their future car use, people behave more in line with their personal norms. Unsurprisingly, the largest reduction was found among people with strong habits and strong personal norms – this makes sense, of course, since this is the group that most desired to change their behaviors but also found it most difficult to do so because of their strong habits.

Implications for environmental policy

90. Interventions to increase awareness may be mistargeted: Often, people may be well-intentioned about reducing their environmental impacts, but find it difficult to do so because of their habits. This study, on the other hand, illustrates a way to convert habitual choices to deliberate ones, which may in some cases be more effective than awareness-building. Of course, persistence of these impacts was not evaluated, and this would be an important topic to study if a large-scale rollout of this type of intervention were considered. Neither were costs and effectiveness quantitatively assessed, which would be necessary for use as a practical policy tool.

Making people reconsider their travel mode choice

Verplanken, B., Walker, I., Davis, A., Jurasek, M. (2008), "Context change and travel mode choice: combining the habit discontinuity and self-activation hypotheses", Journal of Environmental Psychology 28, pp.121-127.

Research question

91. Can a context change encourage more pro-social / pro-environmental behaviours?

Experiment

92. Travel mode choices of a university's employees were studied via a survey on car use and environmental attitudes. The aim was to evaluate the impact of a context change and level environmental concern on car use. The employees were divided into 2 groups: those who had recently moved, and those who had not. Together with data on stated environmental concern, this information was used to assess how travel mode use depended on environmental concern and potentially mediated by context change. The hypothesis was that context change such as a change of residence would lead to more consistency between value and behaviour.

Results

93. Unsurprisingly, people with high environmental concern were less likely to drive cars. Among environmentally concerned individuals, however, those who had recently moved were less likely to drive cars. The researchers argued that this finding was due to the fact that the recently moved were less locked-in to habits and therefore could more easily adapt their behaviour to their values. A context change permits a transformation of normally habitual behaviours into deliberate ones, allowing a reasoned (re)consideration of all available transportation options.

Implications for environmental policy

94. This study (and others like it) illustrates that one of the most effective approaches to changing environmentally harmful behaviours can be when individuals find themselves in new contexts, making thoughtful and reasoned (as opposed to habitual) choices. These types of "pivotal moments" can include change of residence, purchases of cars and appliances, getting married, or having children. In contrast, when individuals are locked-in to habits, they may not be very responsive to policies targeting behaviour change, even when their underlying values (*e.g.* pro-environmental attitudes) suggest that they should respond to such instruments. Therefore, allocating resources to take advantage of pivotal moments rather than targeting habitual behaviours is likely to be more cost-effective.

A team approach to improve environmental behaviour in the household

Staats, H., Harland, P. and H.A.M. Wilke (2004), "Effecting durable change. A team approach to improve environmental behavior in the household", Environment and Behavior, Vol. 36, No. 3, pp. 341-367.

Research question

95. Do information, feedback and social influence increase long-term behaviour change?

Experiment

96. The experiment evaluated the effects of the Dutch EcoTeam Program (ETP), using 150 people in the Netherlands who were successfully recruited to participate in the program. An "EcoTeam" is made up with 6 to 10 persons who will intend to change their behaviours across 6 thematic areas to become more pro-environmental. The intervention (referred to as social support) consists of recruiting and supporting the teams, providing them with workbooks with information about the environmental problem, the consequences of their acts and practical advice. EcoTeams met twice a month to discuss their progress, difficulties and also exchanged experiences and advice before preparing for the next theme. Feedback was also regularly given to help the group members monitor their progress. ETP participants were compared with a selected sample of the Dutch population having the same demographic and economic characteristics.

Results

97. In comparing ETP participants with non-participant sample (a yearly panel survey, representative of the Dutch population), it was found that ETP produced significant pro-environmental behaviour change that was retained – and in some cases even increased – for 2 years following the intervention.

98. Habits were shown to drive participant behaviours more than the *ex ante* intentions they expressed. However, intentions were found to be good predictors of behaviours when people faced strong social pressures. The people more likely to be socially influenced were the ones whose behaviours were least driven by their habits. However, one caveat of the researchers' conclusions was that ETP participants were mainly people with rather pro-environmental behaviour relative to the Dutch population.

Implications for environmental policy

99. Among a significant portion of the population, strong social influence can overcome habit to produce behaviour change. Moreover, providing social support for behaviour change can be a powerful tool for pro-environmental behaviour in the long term. Providing social support for pro-environmental behavioural change among households could provide a legitimate policy tool. To implement such a policy at scale, more analysis is needed to quantify the effectiveness and costs of this approach among general populations.

Trust and learning in the agricultural field

Buck, S., Alwang, J. (2011), "Agricultural extension, trust, and learning: results from economic experiments in Ecuador", Agricultural Economics 42 pp.685-699.

Research question

100. Can interventions to build trust between farmers and agricultural extension personnel increase the level of learning and adoption of agricultural technologies?

Experiment

101. Farmers were randomly selected from a community in Ecuador to participate in an agricultural training program, and then to take an exam to evaluate how much they had learned. A control group of farmers, who took the exam but did not receive training, was also used. All farmers (treatment and control) played an economic game which measured the level of trust they placed in (a) community farmers and (b) agricultural extension technicians. Performance on the exam was then analyzed to see how effective training was, and how this varied with initial levels of trust.

Results

102. The more farmers trusted technicians, as compared to community farmers, the more they learned during the training. As a result, they were also more likely to accept the new agricultural advice provided by the technicians. Other farmers were much more sceptical concerning the technicians' motivations, not believing that they were acting in the interests of local farmers.

Implications for environmental policy

103. This experiment highlights the importance of trust in different information sources as a precursor to learning. In the environmental arena – particularly on the topic of climate change scepticism – this research suggests that educational campaigns about climate change are unlikely to be effective unless individuals trust who is providing the information. Although this point may seem obvious, it suggests that policies aimed at building support among households to combat climate change may be more effective if they first try to build trust between citizens and scientists/experts, before embarking on educational and awareness-building campaigns.

Present biased farmer and use of fertilizer

Duflo, E., Kremer, M., Robinson, J. (2011), "Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya", American Economic Review, 101: 2350-2390.

Research question

104. Do farmers procrastinate until it is 'too late' to purchase and use fertilizer, and if so are there economic instruments which can serve as commitment devices to help them overcome this procrastination?

Experiment

105. The experiment was conducted in Kenya among 208 farmers through a "Savings and Fertilizer Initiative" (SAFI) program. Fertilizer adoption is an interesting economic topic, because in developing country contexts it is almost always profitable to apply fertilizer and yet often adoption rates are quite low – presenting a paradox for the rational choice model. With the basic SAFI program (one of the treatments in the experiment), free delivery of fertilizer was offered at harvest – though the fertilizer itself was sold at its retail price. Importantly, the cost of obtaining the fertilizer, in terms of time and money, was small relative to the cost of the fertilizer itself and the time involved in applying it. An additional treatment (called *ex ante* SAFI) allowed the farmers to choose when the fertilizer would be delivered. The theory behind this treatment was that, if farmers knew they had a tendency to procrastinate, then they would choose an early delivery date, so as to increase the chances that they would actually use the fertilizer. Additional treatments were also considered in which free delivery was offered closer to the required application date (2-4 months after harvest) as well as offering the fertilizer itself at a steep discount (50%).

Results

106. The SAFI program increased fertilizer use by 11% among the treated farmers (including both the basic and *ex ante* treatments). In the *ex ante* treatment, almost half of the exposed farmers requested that fertilizer be delivered immediately after harvest – suggesting that they were aware of their tendency to procrastinate in their fertilizer applications. The effects of heavily subsidizing the price of fertilizer directly were similar in magnitude, in terms of fertilizer use. The authors argue therefore that the free-delivery option is more efficient than a heavy, direct subsidy: Because the former does not encourage overuse of fertilizer (and it is cheaper for the government). No evidence of impact persistence is found: When the program ceases, fertilizer use falls to around its original level.

Implications for environmental policy

107. There are numerous, analogous situations where procrastination may restrict households' adoption of energy- or water-saving products, even though their adoption is economically rational from a household perspective. Innovative programs which can serve as commitment devices (or, more generally, as ways to overcome procrastination) may have an important role to play in increasing penetration of these technologies, and may – in some cases – be more cost-effective than direct subsidies.

The impact of watching eyes on charitable giving

Ekström, M., (forthcoming), "Do watching eyes affect charitable giving? Evidence from a field experiment", Experimental Economics.

Research question

108. Can an observation cue affect pro-social behavior – in this case, charitable contributions?

Experiment

109. The aim of this field experiment, done among 38 retail grocery stores in Sweden over the course of 12 days, was to evaluate to what extent a picture of watching eyes would affect people's donation to a charity. It took place in a Swedish supermarket chain where customers who recycle cans and bottles received a refund for these materials. For the experiment, they had the choice between keeping the recycled amount for themselves and giving it to a charity. Among half of the sample of grocery stores (randomly selected), a picture of watching human eyes was directly posted on the recycling machines in order to assess the effect of a third party observation.

Results

110. There was no significant different in the average contributions at the treated and control stores. However, when controlling store "crowdedness," the research found that the watchful eyes did increase donations by 30% on average at times when the stores were not crowded. The mechanism by which the image of the "watching eyes" increased donations was not discussed.

Implications for environmental policy

111. This research suggests that individuals subconsciously desire to be viewed by others as pro-social. As this type of intervention is so obviously cheap, it is likely quite cost-effective to increase contributions to public goods, even when the effects are small. However, this particular intervention raises some important recurring questions in this body work about paternalism and the role of government policies in influencing individual behavior. If the mechanism for action in this intervention is through subconscious influence, then this type of intervention is little different from subliminal messaging – which is illegal to use in advertising, for example, in the USA.

Cooperation and punishment opportunities in providing public goods

Fehr, E. and S. Gächter (2000), "Cooperation and punishment in public goods experiments", American Economic Review 90(4): 980-994.

Research question

112. Do people always free ride when requested to contribute to a public good? Can cooperative behaviour emerge "spontaneously" (*i.e.* without external intervention) and be maintained?

Experiment

113. The experiment evaluated cooperation in a public good game with costly punishment opportunities. Cooperation is measured in the experiment as successive contribution amounts to a public good from players' private endowments. Subjects were students at the University of Zurich (Switzerland). Four different treatment conditions were implemented: A "stranger" treatment (in which players changed groups between rounds of play) with and without punishment opportunities, and a "partner" treatment (in which group composition remained fixed across rounds of play), also with and without punishment opportunities. Participants played for ten periods in a given treatment.

Results

114. Even when costly punishment opportunity exists, economic theory would imply that no cooperation would emerge because of the benefits of free riding. However, when there was punishment opportunity, the average contribution increased from very low levels (in the no-punishment groups) to over 50% of players' experimental endowments (when costly punishment was allowed). It appears that the more the free riders deviate from the standard contribution, the stronger are negative emotions aroused in others with respect to the non-cooperative behaviour. This provided a credible threat to potential free riders, making it rational for them to behave cooperatively. Over time, when cooperation emerged, it remained stable across rounds of play. Consequently, costly punishment opportunities facilitate stable cooperation in a group. As would be expected, the "partner" treatment was the most cooperative relative to the "stranger" treatment when punishment was allowed, but both groups converged to free riding behaviour when punishment was not possible.

Implications for environmental policy

115. The standard prescription for public goods problems has typically been a top-down, externally-imposed approach, in which a government levies taxes to finance provision of the good. The study described here tentatively suggests that an alternative, more bottom-up approach would be used to design institutions in such a way that permits individuals to punitively punish free riders. Similar approaches may also be effective in common-pool resource problems, which also faces a tension between cooperative and "rational" strategies. However, this study is a small lab experiment, and the results need to replicated in applied, policy-relevant contexts before we can understand the policy implications of these insights.

"Moral crowding out" in an Israeli daycare center

Gneezy, U. and A. Rustichini (2000), "A Fine is a Price", Journal of Legal Studies, Vol 29, No 1, pp. 1-17.

Research question

116. How does applying price incentives to encourage a social norm transform the norm into a commodity, and therefore make previously unacceptable behavior more acceptable?

Experiment

117. A group of daycare centers in Israel had a problem with parents showing up late at the end of the day to collect their children. The researchers evaluated the impact of an intervention which imposed a fine on tardy parents. The fine as subsequently removed to see if the original behavioral patterns reemerged.

Results

118. Once the fine system was put in place, parents showed up significantly *later* than in the pre-intervention period. That is, the impact of the fine was the opposite of what was expected. Moreover, after the fine was removed, parents did not return to their original behavior – they remained tardier than before the fine was introduced.

Implications for environmental policy

119. This study is one of the earliest and most popular examples of "moral crowding out" – the notion that price incentives can sometimes abolish individuals' intrinsic motivations to engage in pro-social behavior by "monetizing" social norms. There is much ongoing research looking at whether and how moral crowding out may be relevant for policy, either directly (for the purposes of predicting policy impacts) or indirectly (for the purposes of understanding the welfare effects of the policy). What remains to be seen is whether there are relevant and externally valid examples in which the gains of price incentives can sometimes be outweighed by the costs of moral crowding out. One potential example of this can be found in the article "The Cost of Price Incentives," summarized elsewhere in this inventory.

Effects of default options on organ donation

Johnson, E.J. and D. Goldstein (2003), "Do defaults save lives?", Science, 302, pp. 1338-1339.

Research question

120. Does a change in default option affect individuals' decisions to register as organ donors?

Experiment

121. In an online experiment (using a convenience sample of web-users) – supplemented with cross-country survey data - subjects were asked if they would be organ donors in three different situations. In one experimental group – with "explicit consent" – people were asked to actively indicate their consent to be a donor from a default of not being a donor (opt-in). In another experimental group – called "presumed consent" – subjects had to actively choose **not** to register as an organ donor, from a default of being a donor (opt-out). In the last, neutral treatment group, no default was specified.

Results

122. Overall, organ donor registrations were about twice as high in the presumed consent and neutral treatments (80% of subjects registering as donors), as compared to the explicit consent treatments (40% registering). The mechanisms for why changes in the default appeared to affect behaviour were not able to be determined using the data. The researchers hypothesized that defaults work by perhaps providing an implicit recommendation, with the presumed consent default sending a message that people "should" register. Alternatively, the researchers hypothesized that biases towards defaults and status quos may be due to the relative effort required to make an active decision as opposed to passively accepting the default.

Implications for environmental policy

123. In environmental policy, there are numerous areas where defaults could be manipulated to reduce the environmental impacts of consumer behaviour – *e.g.* paperless e-bills and bank statements, CO_2 offsets for motor-vehicle travel, etc. This study suggests that interventions which manipulate default options may be a cost-effective approach to increasing pro-social / pro-environmental behaviours. However, additional work needs to be done to evaluate whether the impacts from default changes can persist over longer periods of time. More transparent discussion also needs to be had among policymakers about the ethics of using these kinds of interventions.

The effects of advertising and price incentives on alcohol consumption

Saffer, H., Dave, D., Grossman, M. (2012), "Behavioural economics and the demand for alcohol: results from the NLSY97", NBER Working papers 18180, National Bureau of Economic Research.

Research question

124. How are the effects of price incentives and advertising on people's alcohol consumption determined by past alcohol consumption patterns?

Experiment

125. This paper used representative US data from repeated observations of 8,984 people between the ages of 12 and 16, from 2002 to 2009. This study aims at measuring to what extent advertising exposure and price incentives affect alcohol consumption, and how these effects vary with different past behaviour. The sample was divided into moderate drinkers and heavy drinkers (based on data of historical consumption) to measure accurately the effect on different types of consumers.

Results

126. The majority of the drinkers in the sample are moderate drinkers and a minority are classified as heavy drinkers, based on past behaviour. Higher prices (through taxes) would be expected to be an efficient instrument to reduce consumption, and this is confirmed when the analysis is restricted to the moderate drinkers. However, heavy drinkers are more influenced by advertising than by prices. This is a policy relevant result because heavy drinkers, although a minority in the analyzed population, represent the majority of alcohol-related health costs to society. Thus, regulatory instruments controlling alcohol advertising may be a more efficient means of reducing these health costs.

Implications for environmental policy

127. At a general level, this study focuses on addiction – a behaviour which is not normally accounted for in the rational actor model of consumer decisions. Much environmentally-related behaviour may be construed to be addictive, such as transportation behaviours as well as energy/water conservation behaviours around the home. Indeed, much applied research on environmental behaviours has focused on how to modify habitual behaviours such as car use, thermostat settings, and recycling behaviours. In this regard, the present study suggests that non-price instruments may be more effective at changing behaviours among consumers who have become more locked into their habit. The study also illustrates an effective application of segmenting consumers by their attitudes and behaviours, facilitating the targeting of policies at the most economically relevant group (in the present study, heavy drinkers, who incur greater health costs than the general population).