

Self-interest and pro-environmental behaviour

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Inspired by the principles used to market physical products, campaigns to promote pro-environmental behaviour have increasingly emphasized self-interested (for example, economic) reasons for engaging with a self-transcendent cause (that is, protecting the environment)^{1,2}. Yet, psychological evidence about values and behaviour suggests that giving self-interested reasons, rather than self-transcending reasons, to carry out a self-transcending action should be ineffective at increasing self-transcending behaviour more generally^{3,4}. In other words, such a campaign may fail to cause spillover, or an increase in other, different environmental behaviours⁵. Here we show that recycling rates are dependent on the information participants receive about a separate environmental behaviour, car-sharing (carpooling in the USA). In two experiments, we found that recycling was significantly higher than control when participants received environmental information about car-sharing, but was no different from control when they received financial information or (in experiment 2) received both financial and environmental information. Our results suggest that, congruent with value theory, positive spillover from one environmental message to another behaviour (car-sharing to recycling) may occur primarily when self-transcending reasons alone are made salient.

When attempting to persuade people to adopt pro-environmental behaviour, it seems intuitive to persuade them that it is in their own interest. Indeed, many campaigns emphasize financial reasons to change environmental behaviour. For example, the website for the UK's Act on CO₂ campaign points to money-saving features of energy-reducing behaviours and appliances¹. Similarly, the USA's Environmental Protection Agency often mentions the financial savings associated with the actions it recommends². However, campaigners have recently raised the possibility that this tactic may reduce the scope for positive spillover in pro-environmental behaviours⁵. Spillover refers to the likelihood that the encouragement of one environmental behaviour (for example, through a campaign), or its performance, will lead to the performance of other pro-environmental behaviours in the future. Thøgersen and Crompton argued that financial incentives might actually decrease the likelihood of positive spillover; that is, such incentives may make people less likely to carry out environmental actions in general⁵.

The theoretical basis for this concern comes from extant psychological models of values and goals^{3,4}—in particular, Schwartz's model of social values⁴. In this model, values that promote self-interest or self-enhancement (for example, power, wealth) tend to conflict with values that transcend personal interest to consider the welfare of the community (for example, helpfulness, protecting the environment), whereas values that follow intellectual and emotional interests in uncertain directions (for example, creativity, freedom) tend to conflict with values that emphasize protecting

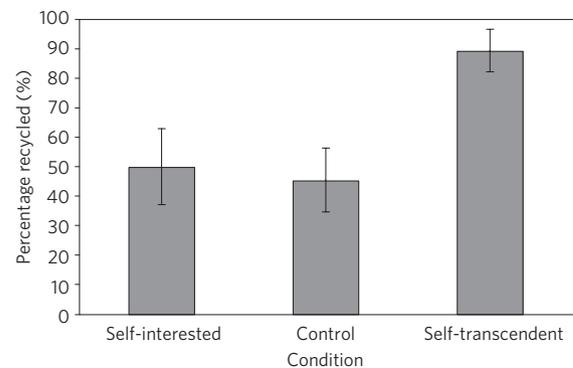


Figure 1 | Experiment 1 recycling. Percentage of participants choosing the recycling bin over the general waste bin for each of the conditions. Bars are ± 1 s.e.m.

the status quo (for example, national security, obedience). This structure of conflicts has been supported in more than 200 samples from more than 70 countries⁶. For example, one experiment primed (that is, made salient or brought to mind) either self-interested or self-transcending values and then examined participants' success at a word puzzle and their helpfulness to the experimenter. Results indicated that priming self-interested values increased participants' puzzle success and decreased their helpfulness. In contrast, priming the self-transcending, benevolence values, led to lower puzzle success and increased helpfulness. These results and those from several other similar priming experiments⁷ stem from the latent motivational conflict between the values. That is, although there were no actual trade-offs between success and helping in this design (participants could have been excellent at the puzzles and highly helpful), the activation of opposing values elicits competing motivational orientations, which alter concrete goals in the situation^{8,9} (for example, to excel at the puzzles or aid the experimenter).

Crucially, these results reveal the potential for self-interested concerns to inhibit pro-environmental behaviour. Activation of pro-environmental values increases various pro-environmental behaviours⁹, because these behaviours have in common the same values and concerns¹⁰, and such effects should translate to other, subsequent behavioural contexts. By contrast, encouraging an environmental behaviour by appealing to self-interested values should instead augment other self-interested behaviours, while inhibiting the self-transcending motivations that underlie pro-environmental action, thus limiting potential positive spillover.

Moreover, such inhibition of pro-environmental behaviour might arise even when self-transcending motives are implicit in the behaviour. For instance, people know that car-sharing is a sociable activity that benefits the broader community; the addition of a self-interested reason to car-share (for example, save money)

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Table 1 | Logistic regression of condition onto bin choice.

	β (s.e.m.)	Wald	d.f.	<i>p</i>	Odds ratio	95% CI for odds ratio	
						Lower	Upper
Condition		7.66	2	0.022			
Control versus self-transcendent	2.32 (0.86)	7.27	1	0.007	10.20	1.89	55.20
Control versus self-interested	0.18 (0.66)	0.08	1	0.782	1.20	0.33	4.36
Constant	−0.182 (0.43)	0.18	1	0.670	0.83		

Note: total $N = 57:22$ in the control condition, 19 in the self-transcendent condition and 16 in the self-interested condition. $R^2 = 0.141$ (Hosmer and Lemeshow), 0.172 (Cox and Snell), 0.233 (Nagelkerke). Model $\chi^2(2) = 10.74$, $p = 0.005$. d.f., degrees of freedom.

may interfere with the broader operation of the self-transcending motive. Campaigners' intuition seems to be that the motives add together in a manner that is more compelling, or that they can be made salient simultaneously to reach different audiences. Both intuitions either pay no attention to spillover effects, or assume that environmental spillover is unaffected by the salience of self-interest. However, the aforementioned priming experiments reveal that the salience of self-interest spontaneously counteracts the self-transcending motivations. Thus, environmental spillover may emerge when self-transcending motives are salient by themselves, but not when accompanied by self-interest.

To our knowledge, no research has yet examined the direct effects of making self-interested, self-transcending, or both types of values salient and measured their impact on pro-environmental behaviour. To provide the first direct examination of this issue, we designed two experiments that primed the different motives for car-sharing—an activity that helps to curtail carbon emissions by reducing independent car journeys and that also may save individual car-sharers money. We expected that priming self-transcending motives would lead to environmental spillover, increasing recycling compared with control. Meanwhile, priming self-interested motives should merely increase the conflict with the self-transcending motives implicit in car-sharing (as implied by the phrase car-sharing itself) and therefore fail to increase recycling.

In experiment 1, participants were randomly assigned to one of three groups: a self-transcendent group received only environmental information about car-sharing; a self-interested group received only financial information about car-sharing; and a control group received neutral information about car travel. Participants received this information while alone and completing several filler tasks (for example, questionnaires unrelated to the experiment) and at the end of the study, the instructions asked them to discard an organizational sheet. Figure 1 shows the percentage of participants in each condition who chose the recycling bin rather than the general waste bin. A logistic regression analysis revealed that condition was a significant predictor of bin choice, $p = 0.005$ (see Table 1). A significantly greater percentage of participants in the self-transcendent condition (89%) chose to recycle the organization sheet than in the control condition (45%), $p = 0.007$ and the percentage who recycled in the self-interested condition (50%) was not significantly different from that of the control condition, $p = 0.782$. Overall, receiving self-transcending reasons to car-share led to more recycling than receiving control information, whereas receiving self-interested information did not.

The fundamental importance of value conflict is apparent in what seems, at first glance, like an inconsistency with the aforementioned priming evidence^{4,7}, wherein the salience of self-interested values alone decreased subsequent self-transcending action. However, in our self-interested condition, self-interested (financial) motives were paired with car-sharing, an activity that may be spontaneously associated with some degree of self-transcendence. This would give rise to an implicit conflict, with

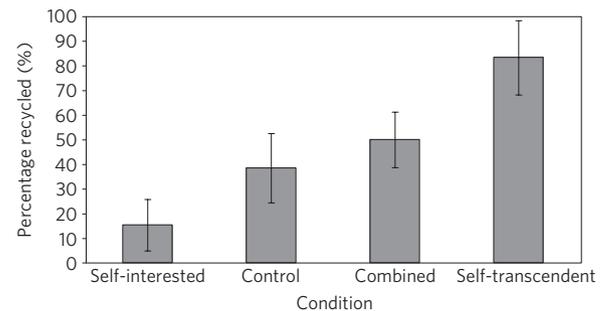


Figure 2 | Experiment 2 recycling. Percentage of participants choosing the recycling bin over the general waste bin for each of the conditions. Bars are ± 1 s.e.m.

the two motives cancelling each other out. If so, then making those self-transcendent motives explicit in the message would be expected to somewhat raise their potency, but should nevertheless have little overall effect when paired with financial incentives. Experiment 2 therefore added a condition wherein participants were given both the environmental and the financial reasons to car-share, the combined condition, but was otherwise conducted in a similar manner.

Figure 2 shows the percentage of participants in each condition who chose the recycling option. Again, logistic regression revealed that condition significantly predicted bin choice, $p = 0.005$ (see Table 2). Recycling in the self-transcendent condition (83%) was once more significantly higher than in the control condition (39%), $p = 0.031$, whereas recycling in the self-interested condition was not (15%), $p = 0.197$. Recycling in the combined condition (50%) was higher than in the self-interested condition, in-keeping with the fact that self-transcending motives were made explicit, but it nevertheless failed to differ significantly from the control condition, $p = 0.562$, again suggesting the impeding role played by salient self-interest.

Finally, we pooled the data for self-transcendent, self-interested and control conditions from both experiments for a combined analysis. Non-overlapping confidence intervals for the odds ratios (ORs) show that self-interested and self-transcendent conditions differ significantly from each other (self-interested: OR = 0.702, 95% confidence interval (CI) 0.254–1.94; self-transcendent: OR = 9.00, 95% CI 2.591–31.266). However, more important from a practical perspective than the presence/absence of statistically significant differences are the odds ratios themselves, as these provide a measure of effect size. This determines the practical utility of self-transcendent versus self-interested campaigns in terms of spillover to other contexts. Inspection of the odds ratios in both experiments and in the pooled analysis shows that the effects of self-transcending reasons were consistently well above Ferguson's recommended professional practice threshold for a strong effect (4.0; ref. 11), whereas the effects of the other reasons (including the

Table 2 | Logistic regression of condition onto bin choice.

	β (s.e.m.)	Wald	d.f.	<i>p</i>	Odds ratio	95% CI for odds ratio	
						Lower	Upper
Condition		9.63	3	0.022			
Control versus self-transcendent	2.08 (0.96)	4.68	1	0.031	8.00	1.22	52.69
Control versus self-interested	-1.24 (0.96)	1.67	1	0.197	0.29	0.05	1.90
Control versus combined	0.47 (0.81)	0.34	1	0.562	1.60	0.33	7.85
Constant	-0.47 (0.57)	0.68	1	0.410	0.63		

Note: total $N = 50$:13 in each of the control and self-interested conditions, 12 in each of the self-transcendent and combined conditions. $R^2 = 0.189$ (Hosmer and Lemeshow), 0.230 (Cox and Snell), 0.307 (Nagelkerke). Model $\chi^2(3) = 13.06$, $p = 0.005$.

combined condition) were consistently below the threshold for a recommended minimum effect (2.0).

Only presentation of self-transcending reasons for car-sharing elicited significant spillover to recycling, whereas presenting self-interested reasons alone, or combined with self-transcending reasons, did not. These effects occurred for a behaviour, recycling, that is the best-known pro-environmental action^{12,13} and it is encouraging that the effects were robust across two studies. These findings demonstrate the importance of considering the psychological effects of the values implicit in campaigns attempting to promote environmentally supportive action.

It is an open question whether these effects also emerge on less prototypical environmental behaviours. Note that, in both experiments, we also tested whether participants would choose scrap paper over new paper during one filler task and in experiment 1 we tested whether they would choose a better-energy-savings mode over a better-performance mode in a computer program. However, these behaviours were not significantly affected by the priming manipulations. It is quite possible that the choices offered were simply not salient as pro-environmental actions, and/or that competing motives prevented clear effects (for example, conscientiousness may have compelled the use of new, clean paper and elicited a reluctance to tamper with the lab computer settings). Our measure of recycling was not vulnerable to these issues, enabling clear replication of effects on this measure across the studies. Still, we hope that these results encourage researchers to probe for similar effects on non-prototypical environmental behaviours, because some can be very high-impact (for example, home retrofitting).

These results are potent in their ramifications for campaigns. This is the first empirical test of the effect of priming messages associated with both sets of values on pro-environmental behaviour. The results make it clear that a focus on the self-transcendent rationale for engaging in pro-environmental behaviour is likely to offer a promising method of increasing positive spillover—a finding that should be very useful for campaigners. At the same time, they highlight a risk that campaigns will fail to spread pro-environmental engagement beyond the specifically targeted behaviour if they include self-interested justifications (as many campaigns do at present). Of course, standard statistical methods cannot be used to conclude definitively that making self-interested values salient will have no effect whatsoever. Moreover, future research is still needed to probe details of the value-priming effects when many values are primed (for example, roles for value importance, order of primes). This is a substantive issue that has yet to be explored. However, for the time being, extant value theory⁴, previous evidence⁷ and the present findings indicate that, if anything, there is a risk attached to the inclusion of self-interested reasons and campaigners should not treat them as a default method of choice.

Furthermore, Thøgersen and Crompton caution that, over an extended period of time, carrying out a pro-environmental behaviour because of financial incentives may have lasting

effects on people's self-perception⁵. According to self-perception theory^{14,15}, when a person acts for self-interested reasons, that person may begin to perceive him or herself as someone who does things for self-interested reasons and thus come to value self-transcendence less. Thus, although there are ultimately a variety of reasons why people behave environmentally^{16–18}, the erosion of a green self-identity over time is a threat to pro-environmental behaviour.

Campaigns can have large target audiences and it is therefore especially important that they have the desired effect without unintended side-effects. Yet, campaigns highlighting financial motives to carry out environmental actions run the risk of decreasing environmental behaviour in other areas or over the long term. Highlighting self-interested reasons instead of or alongside self-transcending actions may undercut the ability of self-transcending values to guide behaviour. Although such campaigns may help to enact the targeted behaviour, they may also prevent people from enacting a range of behaviours that could otherwise have been shaped by self-transcending values.

Methods

In experiment 1, 80 participants from the Cardiff University human participants panel received course credit or £3 for their involvement. The experiment was presented as many short studies involving values, decision-making and creative thinking, which would be organized by completing a checklist. The participant was asked to discard the organizational sheet at the end of the study and the sheet itself contained a small box highlighting this instruction. Randomization of participants into conditions was achieved by using a computer program to randomly order the car-sharing information sheets. Participants completed all parts of the study, including reading the car-sharing information, completing six short filler tasks (for example, questionnaires unrelated to the experiment) and making their disposal decision, alone in the lab room. They were able to dispose of their paper using either a small metal bin, commonly used for general waste, or a tall cardboard container featuring a large recycling logo. We placed the metal bin close to the participant's seat, so that he or she could probably use it while still seated; we placed the recycling bin halfway underneath a nearby table and slightly farther away, which would probably require the participant to stand and was thus a more inconvenient choice. Both bins were empty when the participant entered the room.

After returning to the experimenter at the end of the study, participants were debriefed and probed for suspicion using a funnel debriefing process. We eliminated from analyses participants who indicated they thought we were observing bin choice or who failed to dispose of the sheet of paper as requested (one in the control condition, nine in the self-interested condition and 13 in the self-transcendent condition). During this study, desired sample size for the self-transcendent condition was not achieved during the initial (randomized) run and therefore additional participants were recruited for that condition before analyses were conducted.

In experiment 2, 50 participants from the Cardiff University human participants panel took part for course credit. The procedure was similar to experiment 1, except that we deleted several of the filler tasks from experiment 1 and modified one to include the instruction to dispose of paper, thus removing the need to include an organizational sheet and creating a simpler measure. Participants were asked to create two drafts of a logo for E-Z-Route, a fictional computer navigation company; the first draft should be thrown away and the second draft should be brought to the experimenter in a second lab. By including an instruction to discard paper in one of the main tasks, as opposed to including it as part of the experiment's organization, we aimed to make this instruction

more noticeable and thus reduce the number of participants who simply failed to discard anything. Finally, in this experiment, both bins had roughly equal amounts of paper in them.

At the end of the study, participants were debriefed and probed for suspicion. In this study, no participants were removed from the analysis owing to failure to discard the paper or suspicion.

Experimental manipulation. Our manipulation took the form of a true/false quiz. The quiz contained six (control condition) or seven items (experimental conditions) for each of four topics: hobbies, work, health and travel. For example, in the self-transcendent condition, participants were asked to evaluate the statements 'Driving a car is good for the environment' and 'Car-sharing schemes mean that less pollution and greenhouse gases are released into the atmosphere'. The last item asked participants to rate the importance of protecting the environment to them. In the self-interested condition, they were asked to evaluate statements such as 'Cars with bigger engines cost less to run' and 'The number of people who join car-share schemes in cities to save on running costs has doubled in the past two years'. The last item asked participants to rate the importance of saving money to them. Participants in the control condition received only six neutral items about travel, such as 'The average person in the UK spends over four hours a year in traffic jams' and 'The maximum speed limit in the UK is 90 mph'. Participants in the combined condition (experiment 2 only) received first the self-transcendent and then the self-interested quiz. This ordering follows the structure of the self-interested condition in experiment 1, wherein an implicitly self-transcendent action had financial incentives added to it. Such orderings are also common in many campaigns to combat climate change, as self-transcendent, environmentally friendly actions are increasingly well-known (for example, green products such as low-energy light bulbs and reusable shopping bags), whereas savings are often hidden, especially over long timescales.

Data analysis. We employed logistic regression analyses for both studies, which are commonly used when dependent measures are dichotomous. In logistic regression, it is possible to complete planned contrasts only by selecting a single group as a basis for comparison with the others (the control group in our studies). Alpha levels were 0.05.

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References

- Saving energy at home; available via <http://go.nature.com/RfdjVw> (2011).
- Climate Change—What You Can Do <http://www.epa.gov/climatechange/wycd/>.
- Grouzet, F. M. E. *et al.* The structure of goal contents across 15 cultures. *J. Pers. Soc. Psychol.* **89**, 800–816 (2005).
- Schwartz, S. H. in *Advances in Experimental Social Psychology* Vol. 25 (ed. Zanna, M. P.) 1–65 (Academic, 1992).
- Thøgersen, J. & Crompton, T. Simple and painless? The limitations of spillover in environmental campaigning. *J. Consum. Pol.* **32**, 141–163 (2009).
- Schwartz, S. H. & Rubel, T. Sex differences in value priorities: Cross-cultural and multimethod studies. *J. Pers. Soc. Psychol.* **89**, 1010–1028 (2005).
- Maio, G. R., Pakizeh, A., Cheung, W.Y. & Rees, K. J. Changing, priming, and acting on values: Effects via motivational relations in a circular model. *J. Pers. Soc. Psychol.* **97**, 699–715 (2009).
- Maio, G. R., Hahn, U., Frost, J.-M. & Cheung, W.-Y. Applying the value of equality unequally: Effects of value instantiations that vary in typicality. *J. Pers. Soc. Psychol.* **97**, 598–614 (2009).
- Verplanken, B. & Holland, R. W. Motivated decision making: Effects of activation and self-centrality of values on choices and behavior. *J. Pers. Soc. Psychol.* **82**, 434–447 (2002).
- Thøgersen, J. & Ölander, F. To what degree are environmentally beneficial choices reflective of a general conservation stance? *Environ. Behav.* **38**, 550–569 (2006).
- Ferguson, C. J. An effect size primer: A guide for clinicians and researchers. *Prof. Psychol.-Res. Pr.* **40**, 532–538 (2009).
- European Commission. *Attitudes of European Citizens Towards the Environment* Report No. 295/EB68.2 (2008); available via <http://go.nature.com/LqYbCm>.
- Whitmarsh, L. Behavioral responses to climate change: Asymmetry of intentions and impact. *J. Environ. Psychol.* **29**, 13–23 (2009).
- Bem, D. J. in *Advances in Experimental Social Psychology* Vol. 6 (ed. Berkowitz, L.) 1–62 (Academic, 1972).
- Burger, J. M. & Caldwell, D. F. The effects of monetary incentives and labeling on the foot-in-the-door effect: Evidence for a self-perception process. *Basic Appl. Soc. Psych.* **25**, 235–241 (2003).
- Cornelissen, G., Pandelaere, M., Warlop, L. & Dewitte, S. Positive cueing: Promoting sustainable consumer behavior by cueing common environmental behaviors as environmental. *Int. J. Res. Mark.* **25**, 46–55 (2008).
- Whitmarsh, L. & O'Neill, S. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J. Environ. Psychol.* **30**, 305–314 (2010).
- Griskevicius, V., Tybur, J. M. & Van den Bergh, B. Going green to be seen: Status, reputation, and conspicuous conservation. *J. Pers. Soc. Psychol.* **98**, 392–404 (2010).

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Author contributions

A.C., G.R.M., L.E. and U.H. designed experiment 1; A.C., C.J.H., G.R.M., L.E., S.A. and U.H. designed experiment 2. A.C., C.J.H. and L.E. carried out experiment 1 and analysed the data. S.A. carried out experiment 2; L.E. and S.A. analysed the data. L.E., G.R.M. and U.H. wrote the manuscript; all authors commented on the manuscript. G.R.M. and U.H. supervised the project.

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Competing financial interests

The authors declare no competing financial interests.