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# Nudging the jetset to offset: Voluntary carbon offsetting and the limits to nudging.

# Abstract

‘Nudge’-style interventions have often been successful in terms of changing behaviour, particularly for behaviours which are pro-self. Less research has been conducted into encouraging solely pro-social behaviours with nudges. This paper examines the application of nudges to promote one pro-social behaviour: voluntary carbon offsetting for air travel. Testing nudges through randomised controlled trials and evaluating them using focus groups, nudges were found to be ineffective in promoting offsetting. Two explanations are proposed, addressing specific design problems of the nudges tested which can in theory be overcome, and then more substantive barriers which cannot. This paper presents empirical evidence that nudges are unlikely to be effective when the target behaviour is not perceived as common, is not visible, and has negative connotations e.g. as carbon offsetting is often associated with other add-on extras for flights. Proposing a typology of automatic/reflexive systems of thinking, and pro-self/-social target behaviours, the paper offers a conceptual contribution regarding the limits of effective nudging. Identifying behaviours beyond these limits means that in such cases there is a need for industry-level ‘budges’ – or ‘behavioural economic-informed regulation’, instead of individualised nudges. In regards to the expanding and carbon-intensive aviation industry, it is argued that such a need is particularly acute.

# Keywords

Nudge; Carbon offsetting; Air travel; Behavioural economics; Behavioural insights

# Introduction

In recent years, ‘Nudge’-style interventions have been tested and applied in an increasing number of countries and policy areas (Lourenço et al. 2016; Whitehead et al. 2014). Policy-makers use nudges to encourage citizens to adopt ‘desirable’ behavioural outcomes while still allowing the citizen to avoid the desired outcome easily (Sunstein & Thaler 2008, 6). Nudges usually do not involve changes in the law, banning particular outcomes or applying fines or penalties to them, and so are also inexpensive to implement – both financially and politically (Oliver 2013, 688). Often nudges have been successful in changing behaviour. Here, it is argued that successful cases are often due to the alignment of citizen-consumer (pro-self behaviours) and environment/society (pro-social behaviours) interests. Less research has been conducted into using nudges for pro-social – and specifically pro-environmental behaviours – where ‘desirable’ outcomes benefit the state (in achieving carbon reduction targets, for example) or society (by reducing pollution), yet the individual citizen sees little immediate tangible benefit, and indeed may feel they are losing out in terms of convenience or monetary cost loss. This paper investigates the potential for applying nudges to one such pro-environmental behaviour: voluntary carbon offsetting for air travel*.* Motivating this research is the context of aviation’s substantial and rising contribution to greenhouse gas emissions and climate change. Given the long-standing challenges in regulating this complex, global industry (see Grote et al. 2014), it is posited that voluntary carbon offsets may have a role to play in mitigating emissions, and furthermore that nudges might be used to encourage the take-up of offsets. The primary research question is therefore: What are the potential and limitations of nudging in encouraging carbon offsetting for flying?

Testing nudges through randomised controlled trials (RCTs) and evaluating them through focus groups, nudges were found to be ineffective in promoting this target behaviour. Explanations are proposed, addressing firstly the specific design problems of the nudges tested (which can, in theory, be overcome), and then more substantive barriers to this target behaviour (which cannot). This is the empirical contribution of the paper. The paper also offers a conceptual contribution to literature regarding the conditions under which nudging may or may not be effective, presenting a typology of pro-self/-social, and ‘automatic’ system 1/‘reflexive’ system 2 nudges. The paper concludes by arguing that when nudges are demonstrated to be insufficient, this suggests the need for what Oliver (2013) calls ‘budges’ or ‘behavioural economic-informed regulation’. The findings suggest that for aviation emissions, as has happened in other areas of environmental policy (Moyle et al. 2017; Morgera 2012), it is necessary to move away from individual responsibility on a voluntary basis, towards corporate accountability mechanisms, such as the pro-social budge of an aviation carbon tax.

## Air travel and the environment

Air travel is a significant and growing contributor to greenhouse gas emissions. On an individual level Gössling and Upham argue that “there is no other human activity pushing individual emission levels as fast and as high as air travel” (2008, 5). At the global level, the aviation industry currently contributes around 2.5% of total global CO2 emissions, with emissions projected to multiply by a factor of between 2 and 4 by 2050 (ICAO 2016), with 2013 passenger numbers doubling by 2033 (Boeing 2014). Technological improvements and regulatory mechanisms to alleviate rapidly growing aviation emissions are not currently forthcoming (Grote et al. 2014). In this context, carbon offsetting is a potential mechanism for environmentally concerned passengers to voluntarily “take matters into their own hands” (Kotchen 2009, 31).

A carbon offset is a quantified reduction in emissions of greenhouse gases made in order to compensate for – to offset – an emission made elsewhere. Offsets can be made in compliance markets by states and industrial actors under the UNFCCC’s Clean Development Mechanism (CDM), or in the voluntary market by corporate or individual customers. The focus of this paper is on the latter – individual voluntary carbon offsets (VCOs). Despite a lack of reliable information, seems that there is a small take-up of voluntary offsets, with an estimated 2% of air passengers choosing to buy VCOs for their flights (House of Commons 2007; Brouwer et al. 2008; Gössling et al. 2009). Some studies have detected that once the concept of carbon offsetting is explained to travellers, they express a relatively high willingness to pay (WTP), often higher than the actual market price for VCOs (Brouwer et al. 2008; MacKerron et al. 2009; Lu & Shon 2012).

There is marked gap between these high WTP figures, which suggest a theoretical appetite for offsets, and the low take-up of carbon offsets by actual air passengers. To close this gap, offsetting may be a behaviour which is ‘ripe’ for a nudge. Sunstein and Thaler offer a definition of decisions where a nudge may be necessary: when decisions are difficult, rare, for which there is a lack of prompt feedback, and for which aspects of the situation are difficult to translate into terms the subject may easily understand (2008, 74). The decision to buy flight offsets or not arguably fits this definition. It is a decision which is not intuitive; is (for most) performed infrequently; to the decision-maker the effects of offsetting are not felt directly; and for the environment the benefits of offsetting are deferred. The language of offsetting is also unfamiliar to most people. Given that offsetting thus seems to fall into the category of behaviours ripe for a nudge, we might expect nudges to be effective.

## Pro-self and pro-social nudges

Dominant models of decision-making and behaviour have been derived largely from the classical economic assumption of humans as rational utility-maximisers, or on psychological models such as the theory of planned behaviour (Ajzen 1991) or theory of interpersonal behaviour (Triandis 1989). These models emphasise that when humans do not maximise utility – as we often do not - this is largely due to ‘internal’ barriers (Chatterton 2016). In contrast, the paradigm of behavioural insights or ‘nudge’ (as it is commonly known and referred to throughout this paper), is informed by an understanding of human decision-making associated with the fields of behavioural economics and social psychology. These fields emphasise humans’ imperfect or inconsistent reasoning, and the *external* and contextual constraints to maximising utility. Behavioural insight literature highlights human cognitive heuristics and biases such as ‘present bias’ and ‘status quo bias’, and the influence of social norms and environmental context, which can help explain and to an extent predict decision-making (see Kahneman 2011; Kahneman & Tversky 1979; Cialdini 2007; Ariely 2008; Camerer 2003). The influential work of Thaler and Sunstein in their 2008 book “Nudge”, with its somewhat controversial concept of Libertarian Paternalism (Wilby 2013; Goodwin 2012; Wells 2010), seeks to translate this body of research into policy interventions which might influence citizens’ decision-making outcomes in a variety of contexts. Practically, these interventions involve the adaptation of ‘choice architecture’. Choice architecture refers to the manner in which options are presented to people, e.g. in shop displays, websites, application forms, or machines. Successful nudges adapt choice architecture to make choices which are healthier, greener and financially prudent more likely to be selected.

It is possible to construct a typology of nudges in terms of types of behaviour they can target, and the systems of thinking they can attend to. On the former, Hagman et al. (2015) make a distinction between pro-self nudges and pro-social ones. Pro-self nudges steer individuals away from ‘irrational’ behaviour (or ‘bounded rationality’) which would decrease their long-term well-being. Pro-social nudges steer individuals towards behaviours which would be in the ‘public interest’ i.e. to the benefit of society and/or the state or environment. Hagman et al argue that pro-self nudges are easier to accommodate both normatively and in terms of effectiveness. Normatively, pro-self nudges sit more comfortably within the libertarian paternalistic model provided by Sunstein and Thaler, who argue that nudges should work to benefit the individual “as judged by themselves*”* (Sunstein & Thaler 2008, 5)*.* So when people are nudged to save money or to eat healthier food – actions which are in their own rational self-interest – the ‘nudgee’ would likely recognise the acceptability of the nudge. It follows that, in terms of effectiveness, individuals are also likely to be more receptive to such nudges. Indeed, some of the most high-profile nudge are those which have addressed financial prudence, by auto-enrolment into company pensions, or the US ‘Save More Tomorrow’ scheme (Thaler & Benartzi 2004; Behavioural Insights Team 2013b).

Nudging becomes more difficult when targeting pro-social behaviours, which may benefit the ‘common good’, but where the benefits to the individual are less obvious. For example, if an individual can choose whether to recycle or not, then it may be rational for them to choose not to. Aggregated across society, this ‘rational’ decision may lead to a situation in which no-one contributes to the common good, and a ‘tragedy of the commons’ ensues (Hardin 1968). Pro-social nudges therefore attempt to “counterbalance this rational profit-maximizing behaviour in order to avoid overuse or under-provision to public goods” (Hagman et al. 2015, 442). It is worth noting that while this pro-self/social distinction is useful, it is not entirely clear-cut. Pro-social acts, like donating blood, might carry psychological ‘warm-glow’ benefits to the individual. Likewise, pro-self behaviours, like saving domestic energy and hence cost, create aggregate benefits for society and the state. We might therefore consider the pro-self/pro-social distinction to be a categorical heuristic rather than a definitive cleavage. In this paper, acts which are *primarily* about enhancing benefits to the individual are considered pro-self. Those which are *primarily* about enhancing benefits to public goods or responses to collective action problems are considered pro-social.

Another distinction can be drawn between system 1 and system 2 nudges. System 1 nudges appeal to our automatic, ‘fast’ or intuitive mode of thinking. Examples might include default-switches in online forms, changes in road signs, or the physical design of buildings. They are ‘non-educative’, and work by ‘exploiting’ the bounded rationality of system 1 decisions (Sunstein 2016, 6). The way an individual reacts to these kinds of nudges is likely to be fast, unreflective and possibly even unconscious. System 2 nudges appeal to our ‘slow’ reflexive or deliberative mode of thinking, and usually involve providing information and asking people to process it (Sunstein 2016, 5). This paper combines a pro-social/system 2 nudge. Alternatively, ‘Save More Tomorrow’ and auto-enrolment in pensions would be pro-self/system 1 nudges. Pro-self/system 2 nudges might include providing personalised cost information to promote switching between healthcare insurance plans for the elderly (Kling et al. 2012), or providing testimonial information to encourage potential army recruits in the UK to sign up (Behavioural Insights Team 2015).

There are also examples of pro-social system 1 nudges, including providing ‘smiley faces’ for households who reduce food waste more than the local average (Nomura et al. 2011), or making deducting charitable donations from payroll the default setting (Behavioural Insights Team 2013a). Pro-social system 2 nudges are less numerous, but include the use of detailed information to encourage charitable giving, or encouraging voter turnout using targeted conversations (John et al. 2011).

In terms of ethics, defaults and other system 1 nudges are ‘strong’ and often effective, so using them is therefore more ethically problematic because some people may accidentally be nudged against their own wishes (Willis 2013), or, because defaults are often interpreted as a ‘recommendation’ from the policymaker (Pichert & Katsikopoulos 2008), which might not align with an individual’s preferences. Their use is therefore arguably more appropriate for behaviours around which there is some kind of tacit or explicit acceptance, and such behaviours are more likely to be pro-self. This strength of defaults has been recognised by the European Commission, which has banned the use of pre-ticked boxes by companies on websites, in order to prevent users being accidentally nudged into buying extras or signing up to mailing lists (European Commission 2014). Araña & León (2013) found that including carbon offsets in a flight ticket price as a default (whilst allowing the customer to ‘unclick’ to remove the offset) was an effective nudge, while Löfgren et al. (2012) found that the effect of such a default diminished among those more experienced with offsets. In any case, an interesting consequence of the European Commission legislation is that this pro-social, system 1 nudge would now likely be deemed illegal.

When it comes to the ethical acceptance of particular pro-social target behaviours (such as organ donation, or giving to certain charities) consensus over their merits may be absent, so it may well be more appropriate to use a softer system 2 nudge which is more transparent and easier to avoid. Sunstein (2016) found Americans more accepting of system 1 nudges for less controversial issues such as encouraging voter registration or reducing child obesity, but strongly favoured system 2 nudges for abortion. We can assume that there is no societal consensus over the benefits of carbon offsetting, so it may also be justified to use a system 2 nudge for this target behaviour.

For the legal and ethical reasons listed here, an informational system 2 nudge was chosen as an appropriate intervention to promote the pro-social behaviour of carbon offsetting. To give the trial greater potential real-world applicability, it was deemed that a system 2 nudge was likely to have greater ethical acceptability and be easier to implement legally, than a system 1 nudge. The following section describes the nature of the nudges which were tested and the manner in which data was collected.

# Materials and Methods

## Approach and Sample

Data collection was composed of three inter-related stages: a first randomised control trial (RCT1) conducted in March of 2014, a series of focus groups in October of 2014 and February of 2015, and a second RCT in November of 2015 (RCT2). RCT1 tested whether people could be nudged; the focus groups explored the reasons for the (negative) results of RCT1; and RCT2 tested to see if people could be nudged with an improved design, or if the problems were more substantive. This study employs a pragmatic, mixed methods research strategy (see Teddlie & Tashakkori 2009) where rather than simply testing theories through data collection, the data itself can lead to new theories being formulated and, potentially, re-tested. It also adopts the ‘Test, Learn, Adapt’ model for trialling nudge-interventions advocated by the UK Behavioural Insights Team (Haynes et al. 2012). Getting behavioural interventions right is challenging, and so it is appropriate to test and adjust them by repeating and adapting RCTs (Haynes et al. 2012). By combining RCTs and focus groups, this paper produces findings that illustrate not only behaviour but also meaning and process in relation to carbon offsetting, questions over environmental responsibility, and nudging. The paper’s findings may not be generalizable to wider society in the UK (let alone the rest of the world), but they can provide a richer, more complete sense of the situation among this small but not insignificant segment of it.

The samples for both the RCTs and the focus groups were taken from the student population at the University of Southampton, with the rationale that students largely fit the profile of likely offset customers. Previous studies indicate that the people who purchase offsets are likely to be under 35, educated to university degree, travel alone, go on backpacking holidays, and have high levels of environmental concern (McLennan et al. 2014; Hooper et al. 2008; MacKerron et al. 2009), characteristics which plausibly fit the student population. The most likely-to-offset customers were selected with the belief that nudges will most likely be effective on those most sympathetic to the notion of carbon offsetting in the first place. If those people cannot be nudged towards offsetting then, arguably, no-one can.

## Stage 1 – RCT1

RCT1 was embedded in a short survey about air travel behaviour which was emailed to all 24,040 students at the University of Southampton registered during the 2013/14 academic year. 1,626 students responded to the email and took part in the survey and RCT, a 6.73% response rate. The survey captured data on the number of flights a participant had taken in the last year, the size of party and destination of the last flight, and concern over climate change (using a likert scale), so that any potential correlations with the outcome variables could be observed.

Although survey data was collected, the main aim was to test three different nudges delivered after the survey, to see if they had any effect on two outcomes variables: (1) respondents ‘interest’ in offsetting the carbon from the last flight they took, as measured by visits to a carbon offset site (*attitudes* to carbon offsetting,); and (2), respondents’ likelihood to purchase an offset for the carbon from the last flight they took (carbon offset *behaviour).* Outcome variable (1), offset interest, was measured by the number of respondents who answered ‘Yes’ to the following question:

“Do you want to calculate the carbon generated from the last flight you took, with the option to offset it?”

If respondents clicked ‘Yes’ then a new browser window opened which took them to a carbon calculator provided by partner company carbonfootprint.com where respondents could enter details (origin and destination) of their last flight, and were given a carbon amount for that flight, and a price to offset it (see appendix). They were then given the option to purchase a real offset for that flight.

Outcome variable (2), offset behaviour, was measured by collecting data from carbonfootprint.com on which respondents had actually paid for an offset. This was done by comparing IP addresses from carbonfootprint.com’s payment records with IP addresses collected by the online survey platform.

Participants were randomly and blindly allocated to one of four treatment groups and these two outcome variables were measured for each group. Allocation was performed automatically and randomly by the University of Southampton’s iSurvey platform, achieving roughly equal allocation to treatment and control groups (see Table 1). The nudges that were tested were a ‘descriptive norm’ nudge, a ‘third party endorsement’ nudge and an ‘affective message’ nudge. Significant differences in offset interest and offset behaviour between the three treatment groups and the control group were measured using Pearson’s chi-square tests in SPSS software.

### Table 1: Allocation to the RCT groups

|  |  |  |
| --- | --- | --- |
|  | Frequency | Percent |
| Control | 423 | 26.0 |
| Third Party Endorsement | 421 | 25.9 |
| Descriptive Norm | 398 | 24.5 |
| Affective Message | 384 | 23.6 |
| Total | 1626 | 100.0 |

The *descriptive norm* nudge was used following previous research (e.g. Dolan et al. 2012) into the power of harnessing information about ‘what other people already do’ (a descriptive norm) – as opposed to ‘what you *ought* to do’ (an injunctive norm). In this study, the descriptive norm that was used suggested that carbon offsetting was a tool which other people already use, using figures obtained from the most recently available edition of the annual ‘State of the Voluntary Carbon Markets’ report compiled by the NGO Forest Trends (Peters-Stanley & Hamilton 2013). The message was as follows:

***“Many people already offset their carbon emissions. In 2012, 101 million tonnes of carbon (MtCO2e) were offset voluntarily – that's the same as taking 50 million cars off the road for one year, or 100 million people each*not taking*a London->New York flight.”***

The second nudge chosen was a *Third Party Endorsement*. In marketing, the use of endorsements is common – the employment of celebrities, professional associations and/or public institutions is known to be influential on the purchasing decisions of consumers (for a review, see Pornpitakpan 2004). The successful application of third-party endorsements in nudge-style interventions is not entirely proven, although celebrity endorsement was used in a trial to improve organ donor registration (see John et al. 2011). Different audiences react better to different ‘messengers,’ although identifying *which* messenger is appropriate can be challenging (Dolan et al. 2012).

Because carbon offsetting is relatively unknown and potential offset customers may be wary about where offset payments actually go (Mair 2011), it was considered that a third party endorsement might allay fears over the credibility of VCOs. Third party organisations which use offsets themselves (mostly large companies) or which endorse carbon offsetting (in this case, a UK government department and some high-profile NGOs) were identified for this purpose. The message was as follows:

*“Many organisations, NGOs, charities, companies and government departments endorse carbon offsetting and use it themselves, including: Friends of The Earth, Greenpeace, the Worldwide Fund for Nature (WWF), the UK Department for Energy and Climate Change (DECC), Microsoft, Marks and Spencer, Aviva, Jamie Oliver Ltd, and the Co-operative Group, to name a few.”*

The third nudge was an *affective message,* the rationale being that we are receptive to words and images which provoke an emotional response (Dolan et al. 2012), and the use of affective framing has been influential in marketing and public health campaigns (e.g. Curtis et al. 2007). Because carbon offsetting might be viewed as an abstract concept with little apparent connection to people’s lived experiences, this nudge highlighted the social, ‘human’ element of one particular type of project funded through offset funds – the production of cook stoves in the developing world. Two pictures were also included in this nudge (Figure 1).

### Figure 1: Affective Message Nudge in RCT1



*“Voluntary carbon offsetting means paying an extra amount of money on top of the price of a flight-ticket. This extra money is then used to reduce the amount of carbon dioxide emissions caused by the flight, through a project else-where. These projects can include tree-planting, building renewable energy sources, or reducing deforestation.*

*One type of project funded through carbon offsets is introducing more efficient cookstoves to families in the developing world, instead of using traditional cookstoves or open fires like the picture on the left.*

*These projects have introduced efficient cookstoves to families in in many developing countries such as India, Honduras and Ghana. Simple modern cookstoves, like the one in the picture on the right, cook food more quickly and are insulated, requiring 50-60% less fuel and releasing much less smoke.*

*So as well as cutting carbon emissions by reducing the need for firewood, this kind of project also improves health by reducing exposure to toxic smoke and fumes - a serious problem for the health of millions of women and children.”*

## Stage 2 – Focus Groups

After the results from RCT showed the nudges to be ineffective regarding either offset attitudes or offset behaviour (see the results section below), qualitative data was sought to try and explain what the limitations for nudging for carbon offsetting might be. Six focus groups, each lasting one hour, were held on campus at the University of Southampton, and addressed the emergent research question following RCT1:

*If limitations exist for nudging for carbon offsetting, are these due to design issues, or due to more substantive problems with the policy paradigms of nudge and/or carbon offsetting?*

Participants were shown vignettes of the nudges used in RCT1 and asked to offer their evaluations on them, as well as their broader opinions about carbon offsetting as a concept, and on what might motivate them to purchase offsets themselves.

Following a series of pilot focus groups obtained by random snowball sampling, the main focus groups were stratified by field of study, international/domestic student status, and undergraduate/postgraduate cohorts, yielding six different focus groups (see Table 2). The groups were stratified to create greater homogeneity among participants, which might produce data of greater quality (Corfman 1995). Secondly, stratification by discipline and nationality was done to reflect potential differences in attitude on the environment in general, and offsetting in particular. Previous research suggests that students of subjects such as geography are more likely to display pro-environmental attitudes compared to management or business students (Ewert & Baker 2001; Kaplowitz & Levine 2005; Tikka et al. 2000). Elsewhere, Europeans have exhibited higher levels of awareness of carbon offsetting than North Americans, who have greater awareness than Asians (Brouwer et al. 2008). Full stratification by nationality was not possible, but groups were stratified in terms of UK or international student status. Focus groups were moderated, transcribed and analysed using NVivo software, using codes including “positive/negative evaluation of nudges”, “cost of offsetting” and “ethics of offsetting”.

### Table 2: Characteristics of Focus Group Participants

|  |  |
| --- | --- |
| 10 Geography Domestic Undergraduates (5 male, 5 female) | 8 Geography Domestic Postgraduates (3 male, 5 female) |
| 10 Geography International Postgraduates (5 male, 5 female) | 9 Management International Postgraduates (5 female, 4 male) |
| 8 Management Domestic Undergrads (3 male, 5 female) | 6 Management International Undergrads (3 male, 3 female) |

## Stage 3 – RCT2

RCT2 was also embedded within a short survey about air travel behaviour, and emailed to all 24,182 students at the University of Southampton registered during the 2015/16 academic year. 2,356 students responded to the email, a response rate of 9.74%. Again, respondents were randomly and blindly assigned to either a control or intervention group. Unlike the first RCT, there was only one intervention group in the second RCT. This was done in order to increase statistical power, and thus the chances of detecting a potentially significant but small effect. The same offset company, carbonfootprint.com, was used again in order that results from RCT1 and RCT2 could be compared.

Both the intervention group and control group received the same survey. Following this, the intervention group alone received the social norm nudge (Figure 2). This nudge incorporated the text from RCT1 but also added new material (everything above the line in Figure 2), informed by the focus group data. As with RCT1, significant differences in offset interest and offset behaviour between the three treatment groups and the control group were measured using Pearson’s chi-square tests in SPSS software. In order to determine which factors were influencing interest in offsetting, a logistic regression was conducted, entering in the variables ‘size of party on the last flight you took’, and ‘climate change concern’, as these variables have previously been shown to be related to likelihood to offset (McLennan et al. 2014).

### Figure 2: Social Norm Nudge in RCT2

Voluntary carbon offsetting means paying an extra amount of money on top of the price of a flight-ticket. The cost of an offset is usually about 3% of the flight cost.

As this diagram shows, this extra money is then used to reduce an amount of carbon dioxide from the atmosphere, equal to the carbon emissions caused by the flight, through a carbon-reduction project.



These projects can include tree-planting, building renewable energy sources, or reducing deforestation.

Projects must follow standards recognised by the United Nations to ensure that money is spent delivering the promised carbon-reductions.

Many people already offset their carbon emissions.In 2012, 101 million tonnes of carbon (MtCO2e) were offset voluntarily by individuals and businesses.

That's the same as taking 50 million cars off the road for one year, OR 100 million people each not taking a London->New York flight.**You can make the last flight you took 'carbon-neutral' by purchasing a carbon offset.**

# Results

## Stage 1 – RCT1

Offset interest – as measured by the number of respondents who clicked ‘Yes’ to the question *“Do you want to calculate the carbon generated from the last flight you took, with the option to offset it?”* was expressed by 51.9% of respondents, across all treatment groups (see table 4 for a breakdown).

The effect of the nudges was not significant at the 95% confidence level, when a Pearson’s chi-square test was conducted for the interventions separately against the control, Pearson *χ2* (3, 1626) = 5.918, *p* = 5.918, meaning that there is no association between intervention group and offset interest. When the three intervention groups were collapsed together and compared against the control there was no significant difference, Pearson *χ2* (1, 1626) = 0.06, *p* = 0.938. In this sense, the nudges all ‘failed’ to have any influence.

### Table 3: Interest in offsetting by Treatment group

|  |  |
| --- | --- |
| *Intervention Group* | *% Expressed ‘interest’ in Carbon offset within group* |
| Control | 51.8 |
| Third Party Endorsement | 47.3 |
| Descriptive Norm | 55.1 |
| Affective Message | 54.0 |

For the measure of offsetting behaviour, results collected from CarbonFootprint.com showed that none of the interventions were successful in terms of actual offsets purchased. Only 1 respondent paid for an offset out of 1626 respondents.

All the nudges failed to affect either participants’ offset behaviour or interest. In order explore why the nudges failed and design new ‘improved’ nudges, the focus groups were intended to shed light on the failings of stage one.

## Stage 2 – Focus Groups

### Design Issues

The content of each nudge from the first RCT was presented to the participants for evaluation and discussion. The descriptive norm nudge received the most positive comments from participants, who tended to appreciate the motivational power of social norms, especially when quantifiable data was presented. Many participants also said they liked the fact that the ‘meaningless figure’ (of 101 million tonnes of carbon) was converted into something more ‘tangible’.

 Eli (International Geography Postgrad): *“You can imagine 500 million cars. It’s an attempt to make you realise what kind of influence it can have and I think this could help people understand the problem, and also understand the influence you could have.”*

Participants also often talked positively about being ‘part of something’ bigger than their own individual action, which might otherwise seem pointless or insignificant.

Maddie (UK Geography Undergrad): *“It kind of seems quite impressive, if you read that statement. It’s like ‘Ooh that’s really good maybe I should join in’ and might make you wanna contribute as well.”*

In comparison, the Third Party Endorsement nudge was viewed negatively by almost all participants, mainly for the inclusion of large companies in the list, whom participants did not wish to be aligned with. In some cases this was for reasons connected to the companies’ perceived ethical practices, as with Krystal.

Krystal (International Social Science postgrad – Pilot): *“I don’t let Marks and Spencer set my ethics, considering that they are using children to make their garments…I don’t take my ethical cues from these people”.*

Other participants saw a problem with the size of these big companies. As in the case of the descriptive norm, the large size of the ‘people who already offset’ – in this case, large companies – made the participants’ own offset behaviour seem insignificant, and a reason to ‘free-ride’. The lively discussion which this nudge provoked emphasizes the importance of using an appropriate ‘messenger’ when designing nudges (Savage et al. 2011; Dolan et al. 2012).

Chas (UK Geography Undergrad): *“Listing all the big companies that do it makes me think ‘well if all the big companies do it, why should I, because they contribute more than I do?’ Is that really bad?*

*“Because all the big companies do it, and they must have a much greater need for it, because of lots more travel, then like, why should I bother because, to be fair, my contribution compared to theirs would be really small, so it would be fairly pointless.”*

Reaction to the affective nudge was perhaps the most divided. While many participants thought that providing a human story with pictures made the benefits of offsetting seem more ‘real’, others considered it confusing, and looked more like ‘charity’ than offsetting which, surprisingly perhaps, was often not viewed positively. As many participants reported feeling ‘charity fatigue’, this nudge was unlikely to make them offset, or, as many of them tellingly put it, to donate’.

Josie (UK Management Undergrad): *“I think it’s hard-hitting seeing pictures, but, it’s really bad for me to say, but there’s so many charities and things out there, like this sort of comes up all the time, helping people. So for me, I know I’m probably not even gonna read the text. I’ll just look at the picture and assume that it’s another one. I know that sounds bad but there’s quite a few out there so…”*

The evaluations of the nudges suggested that a social norm nudge, if properly configured, held the most potential for encouraging offsetting.

### Substantive issues

Wider problems with carbon offsetting were also identified in the focus groups. Participants were broadly supportive of the concept of offsetting but had concern with issues of accountability – “where does the offset money go?” and “who oversees the projects?” were recurrent queries, reflecting the fact that most participants had little experience of offsetting themselves. Linked to this was the fact that most participants felt the social norm message was ‘too distant’ and vague, and would be far more powerful if it could harness peer pressure. The proposition that social media could be used to inform someone that their peers offset was well-received by many participants.

Frankie (UK Geography Undergrad): *“With a facebook link ‘your friends do this’. That would probably be better.”*

Chas (UK Geography Undergrad): *“I’d do it. I’d think if they're doing it then I should too!”*

Frankie: *“Make me feel bad* (laughter).*”*

Tess (UK Geography Undergrad): *“I think that’s more effective than any company.”*

Participants also likened the opportunity to purchase offsets with other annoying ‘extra’ services such as insurance, car hire or hotel rooms, which are often offered at the point of sale of flight tickets.

Pat (International Management Postgrad): *“Travel insurance, extra bags, and you’re like ‘skip, skip, skip’.”*

For some participants, the main problem with offsetting was the fact that it costs money, time and may be an inconvenience, for which the passenger receives nothing tangible in return. This view was especially prevalent among the management students.

Ann (UK Management Undergrad): *“If I was buying a flight and they’re like ‘donate ten extra pounds’ I’d be like ‘well the flight’s costing enough already.’ I wouldn’t really wanna pay that, that might be because of my financial situation at the moment but I don’t think I will.”*

This is, of course, a key challenge of this paper, that carbon offsetting is a pro-social behaviour which does not immediately ‘benefit’ the individual. However, many of the participants were surprised that carbon offsets were much cheaper (on average comprising around 3% of a given flight ticket price) than they had imagined. Expectations and willingness to pay have been shown to be affected by a numerical anchor given before a decision is made (Ariely et al. 2003; Dale 2015), and it is plausible that if participants knew roughly how expensive/cheap a carbon offset was in advance, they may have been more willing to buy one.

The focus groups suggested that the descriptive social norm nudge was the design most likely to influence participants’ decision to offset. This is why a social norm-style nudge was chosen for the second RCT, with new features intended to address some of the barriers which the focus groups highlighted. Firstly, as offsets were viewed as an unknown quantity, the ‘new’ nudge explained the concept of offsetting in greater detail, including the fact that offsets must comply with accreditation schemes such as the Verified Carbon Standard (VCS), recognised by the United Nations (Broderick 2009). Secondly, the apparent assumption that offsets will be expensive was addressed in the second RCT by including a price ‘anchor’ (Figure 2).

## Stage 3 - offset interest and offset behaviour

Of those in the ‘Control’ group (who received no nudge), 679 people expressed interest in offsetting (57.6%). Of those in the treatment group (who received the nudge), 626 expressed interest in offsetting (53.1%). This means that instead of an expected increase, offsetting interest decreased by 4.5% in the treatment group compared to the control group.

### Table 4: Interest in offsetting by Treatment group (RCT2)

|  |  |  |
| --- | --- | --- |
| *Intervention Group* | N | *% Expressed ‘interest’ in Carbon offset within group* |
| Control  | 1178 | 57.6 |
| Social Norm Nudge | 1178 | 53.1 |
| Total | 2356 |  |

A Pearson’s chi-square test indicates that this effect of the nudge is significant at the 95% confidence level (Pearson *χ2* (1, 2356) = 4.825, *p* = 0.028), although with the control group being more likely to express interest in offsetting than those that received the nudge.

In order to determine which factors were influencing interest in offsetting, a logistic regression was conducted, entering in the variables ‘size of party on the last flight you took’ (with the baseline being 4 or more people), and ‘climate change concern’ (baseline being extremely concerned). Respondents who had not travelled by aeroplane in the last twelve months were excluded from this model. This model explained 12.5% of the variance in carbon offsetting (Pearson *χ2* (8, 2199) = 214.164, *p* = 0.000, *r2*= 0.125). Including these two variables in the regression shows that the intervention is not a significant predictor of offset interest, but that the variance in the sample is explained by the participants’ concern over climate change or the size of the party when they last travelled, and not whether they received the nudge or not (see Table 5). Those who travelled in smaller groups or expressed greater concern over climate change were more likely to express interest in offsetting, confirming previous findings (McLennan et al. 2014; Hooper et al. 2008; MacKerron et al. 2009).

### Table 5: Logistic Regression with intervention group, size of party and climate change concern

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | ***P* value** | **Beta** | **Expected Beta** | **Standard Error** | **Confidence Interval (95%) for Expected Beta** |
| **Lower** | **Upper** |
| Intervention group (nudge against control as baseline) | 0.196 | 0.118 | 0.889 | 0.091 | 0.941 | 1.344 |
| Size of party – 4+ (baseline) | 0.004 |  |  |  |  |  |
| Size of party – 1 (only you) | 0.000 | 0.406 | 1.500 | 0.114 | 0.201 | 1.875 |
| Size of party – 2 people (including you) | 0.098 | 0.196 | 1.217 | 0.118 | 0.965 | 1.535 |
| Size of party – 3 people (including you) | 0.567 | 0.096 | 1.100 | 0.167 | 0.793 | 1.528 |
| Climate Change Concern – 5 (Very concerned) (baseline) | 0.000 |  |  |  |  |  |
| Climate Change Concern – 1 (not concerned)  | .000 | -2.271 | 0.103 | 0.297 | 0.058 | 0.185 |
| Climate Change Concern – 2  | .000 | -1.793 | 0.166 | 0.178 | 0.118 | 0.236 |
| Climate Change Concern – 3  | .000 | -1.468 | 0.230 | 0.148 | 0.172 | 0.308 |
| Climate Change Concern – 4 | .000 | -0.662 | 0.516 | 0.140 | 0.392 | 0.679 |
| Constant | .000 | 1.132 | 3.101 | 0.145 |  |  |

As in RCT1, a very small number of participants, 4 out of 2356, actually bought an offset. 2 of these were from the treatment group and 2 were from the control group.

In RCT2, the nudge appears to have no influence on interest in offsetting, once ‘number of party’ and ‘concern over climate change’ are controlled for. The data gathered from the three stages indicates either design flaws with the interventions, more substantive barriers which make carbon offsetting a behaviour which is not amenable to nudging, or both.

# Discussion

Past research indicates the potential for initiating pro-social behavioural change using system 2 nudges, yet the findings here show the limitations of such an approach. In both RCTs, the nudges did not significantly increase interest in carbon offsetting. For actual offset behaviour, the extremely low number of offset purchases points to a technical weakness of the RCT design – particularly the fact that the offset website was not perceived as especially user-friendly and participants were asked to purchase the offset long after they had purchased the flight – rather than a generalizable finding. The fact that around half of respondents expressed interest in offsetting but almost none purchased any could also be seen as further evidence for the well-known attitude-behaviour gap (e.g. Hibbert et al. 2013), a gap which may be particularly ‘wide’ when the target behaviour involves a financial cost. Indeed, cost, a lack of faith in the efficacy of offsets, and concern about ‘free-riders’ have previously been identified as explaining the gap between reported willingness to offset, and an observed lack of offsetting behaviour (Eijgelaar 2011; Hooper et al. 2008; MacKerron et al. 2009). The reasons why the nudges also failed to influence interest in offsetting require deeper examination. Here there is an acknowledgement firstly of the problems in the design of the nudges tested, followed by more substantive barriers which may render carbon offsetting as unamenable to system 2 nudges in any case, and thus the need for an alternative policy approaches.

## Design problems

There are three potential design issues with the second RCT, which, even though it was adapted and ‘improved’ following the previous stages, still failed to generate interest in offsetting.

Firstly, despite the focus group data suggesting participants would welcome more information, including more information in the second RCT may have made the content of the nudge overwhelming or uninteresting. Previous research into the effect of energy efficiency labelling for domestic appliances found that there was a ‘sweet spot’ in terms of how much information had a significant effect on purchasing behaviour. Too little or too much information was counterproductive (IPSOS & London Economics 2014), and the same may be true of this intervention. Adapting the amount of information provided to create a nudge which hit the ‘sweet spot’ for information provision might conceivably be more effective.

The social norm message may have been ineffective because it was too ‘distant’ from the participants. The message that ‘many other people already offset’, even accompanied with relevant statistics, may have seemed too abstract, as the focus groups suggested. Participants may also have thought that because they didn’t know of many people who bought offsets in their own lives – i.e. using their ‘availability heuristic’ – it felt probable that almost no-one buys offsets (Tversky & Kahneman 1974). This may have given them licence to ignore the call to offset, because they ‘knew’ from their own experience that it was not a common behaviour. As carbon offsetting is a marginal activity (for now, at least), using a social norm nudge is unlikely to be effective in encouraging it.

Another possible issue with the nudge was that it was framed in terms of what Compton (2016) calls ‘extrinsic values,’ that is, referring to issues of social status or wealth, as opposed to ‘intrinsic values’ such as care for the environment, benevolence and universalism. Previous research has found that for campaigns which are aimed at ‘intrinsic goals,’ such as social justice or care for the environment, using intrinsic value frames foster a far more positive response than using extrinsic ones (Crompton et al. 2014; Büchs 2016), and Mair and Wong (2010) suggest that moral obligation is more likely to predict the take-up of offsets than awareness of the mechanisms by which offsets operate. As the nudge in the second RCT focussed on issues of cost, transparency, and a technical explanation of offsetting, rather than on the broader cause of environmental protection, there may have been a ‘values mis-match’. Given that the participants most likely to be interested in offsetting were those who held higher concern about climate change, addressing their pro-environmental ‘intrinsic’ attitudes might be a way to improve the effectiveness of this intervention.

These issues are identified here because they may contribute to a fuller understanding of when nudges may fail. Future research could test whether addressing these design issues might remove barriers to the target behaviour. However, these issues of design appear secondary to more substantive barriers to carbon offsetting which may mean it is simply not amenable to system 2 nudges, however they might be constructed.

## Substantive barriers

It is possible that if the design issues uncovered in RCT2 were addressed for a third iteration of the nudge, then the outcome may have been more positive. However, the findings from the three data collection stages suggest more substantive barriers to carbon offsetting. Four barriers are identified: ignorance over offsetting and a lack of social support for it; the fact that offsetting is an ‘invisible’ behaviour and so is less subject to social monitoring or peer pressure; the negative associations which accompany carbon offsets; and a lack of incentives to offset. These barriers may be relevant to other pro-social behaviours as well, particularly when system 2 nudges are employed. These barriers suggest a more enduring mismatch between the target behaviour and nudging, and the need for an alternative approach to the policy problem of aviation emissions.

In the previous section, it was argued that nudges could potentially be used if they avoided harnessing social norm messages which might inadvertently highlight the fact that offsetting is a fringe activity, by activating participants’ ‘availability heuristic’. But even if nudging were to take a different form, the fact that carbon offsetting is something which most people have not heard of – as seen in this and previous studies (see Choi & Ritchie 2014; Hooper et al. 2008) – is unlikely to change, at least in the short term. Unlike recycling, organ donation or charitable giving which have been shown to be behaviours that nudging can effectively encourage (see Smith et al. 2015; Behavioural Insights Team 2013a), carbon offsetting was an unfamiliar concept to focus group participants, and therefore expecting people to adopt carbon offsetting on the basis of one nudge might be overambitious.

A second substantive barrier relates to the virtual space in which offset behaviour occurs. Harnessing the power of social norms for online behaviours such as buying flights or offsets is difficult because much online behaviour is often effectively ‘invisible’ to others and lies beyond the gaze of one’s peers. If our behaviour is not exposed to others, then the power of social norm nudging is greatly diminished. Some focus group participants said that if social media outlets such as Facebook were used to show that one’s friends had purchased an offset, then they might be motivated to follow suit. Indeed, research into charitable giving has shown that people are more likely to donate, and to donate more, if they can see that their peers have previously donated to a specific fundraising campaign online (Smith et al. 2015). Future work into harnessing social media to make online behaviours more amenable to social norm-based nudges might thus provide more fruitful results.

Thirdly, a more specific problem is that carbon offsets may have negative connotations. Focus group participants commented that there were many annoying ‘additional charges’ at the point of booking a flight online for extra services such as car hire or travel insurance. Including carbon offsetting as just another ‘additional service’ might mean that it is overlooked or actively dismissed y customers.

The fourth and perhaps most important substantive barrier to carbon offsetting is that there is no tangible incentive for customers to purchase them. Pro-social nudges have been effective in other scenarios such as recycling, reducing unnecessary laundry, and charitable donations. For these behaviours, there is also no tangible incentive for individuals to comply. The difference may be that the other confounding problems outlined above, which specifically affect carbon offsetting, do not affect these other behaviours. That is, when pro-social behaviours are already ‘*common’* (and individuals can refer to their prevalence through their availability heuristic), *‘visible’* (i.e. others can see them being done), and they do not carry negative connotations (as carbon offsetting is associated with annoying ‘extra’ services), then pro-social system 2 nudges might work. If these other problems are present, then it is likely they will not. Interestingly, many focus group participants said that they could appreciate the problem of aviation emissions, and that presenting offsetting as a default option (i.e. a system 1 nudge, which they could opt out of), or even as mandatory (a ‘shove’ in the form of a carbon tax) would be acceptable to them.

# Conclusion

In this paper, the RCT findings shows system 2 nudges to be ineffective in encouraging the pro-social behaviour of carbon offsetting among this sample. Conceptually, this paper attempts to delineate, in greater detail than has previously been established (Sunstein 2016b; Sunstein 2016a; Hagman et al. 2015), some limits to using nudges for pro-social behaviours. As discussed in the introduction, there are instances when, for practical, legal, and/or ethical reasons, ‘weaker’ system 2 nudges are employed over stronger system 1 nudges such as default-options. Despite this ‘weakness’, system 2 nudges have been shown to be effective in encouraging some pro-social behaviours such as charitable giving, or voting (John et al. 2011). For carbon offsetting, however, the focus group data identifies some specific substantive barriers which mean that system 2 nudges are unlikely to work.

The typology presented in Figure 3 illustrates how different nudges might suit particular combinations of target behaviours and systems of thinking, whilst also showing how these different combinations have consequences in terms of likely effectiveness of a nudge, and its ethical acceptability. The nudges tested in this project relate to quadrant (4) as they target a pro-social behaviour (carbon offsetting) and attend to system 2 thinking (by providing information). This means that as an intervention, we might assume ethical acceptability to be high, but effectiveness to be low.

Policy implications arise from these findings. Rather than reject behavioural insights outright, such findings may demonstrate the shortcomings of individualised behavioural policies, which have been criticised as ineffective, slow, and distracting (Barr & Prillwitz 2014; Shove 2010; Hall 2013), and to stimulate greater industrial regulation and accountability instead (Moyle et al. 2017). In this case, that might be a carbon tax applied on all flights, to replace voluntary offsets purchased by a small minority who, for the reasons illustrated here, will likely not respond to nudges. As Oliver argues, “the most effective way of preventing people or organisations harming others is to regulate their activities. Nudge is anti-regulation, but behavioural economics is not” (2014, 698). Oliver calls this approach ‘budging’, or “behavioural economic-informed regulation designed to budge the private sector away from socially harmful acts” (Oliver, 2015, 698). This suggests an interesting way for governments to assert their authority to intervene on a ‘macro’ industry/regulatory level, rather than (solely) on a ‘micro’ citizen/behaviour one.

|  |  |  |
| --- | --- | --- |
| **Target behaviour/****System of thinking** | **Pro-self** | **Pro-social** |
| **System 1**  | (1)1. ‘Save More Tomorrow’ scheme2. Auto-enrolment into pension schemes*(Nudging may be more effective and less ethically problematic)* | (2)1. Smiley/sad faces to encourage recycling
2. Changing letters to increase honesty/compliance
3. Donating to charity from payroll by default
4. Carbon offsets as a default

*(Nudging may be more effective and more ethically problematic)* |
| **System 2** | (3)1. Information provision to Army candidates2. Providing personalised information to make switching healthcare providers easier*(Nudging may be less effective and more ethically problematic)* | (4)1. Providing information to encourage charitable giving
2. Targeted conversations to encourage voter registration

*(Nudging may be less effective and less ethically problematic)* |

*Figure 3: A typology of nudges by target behaviours and systems of thinking*

There are other instances of a fledging move towards ‘budging.’ As previously mentioned, EU legislation banning pre-ticked boxes on websites was itself informed partly by the behavioural insight that consumers are often prone to inertia and ‘default bias’ (European Commission 2014a; European Commission 2014b), and may therefore unwittingly opt into receiving services or communications they do not actually want. The 2018 introduction of the General Data Protection Rules (GDPR) across the EU, where consumers have to actively opt into their data being processed by companies or websites and “privacy is by design and default” (Information Commissioner’s Office 2018), might also be seen as a form of behaviourally informed regulation. Without such a pro-self budge, there is no incentive for companies to seek to actively change consumer behaviour, even if that change might be in the customers’ interests. Similarly, airlines currently also have little or no incentive to change their customers’ interest or behaviour regarding offsetting. These findings might therefore illustrate the need for behaviourally informed regulation, or a pro-social budge such as a mandatory carbon tax on flights. If, as this paper demonstrates, a sample of people which previous literature identifies as likely to offset cannot be motivated to take interest in offsetting across two different experimental settings, then it is highly unlikely that offsetting is a suitable behaviour to be subject to nudge-style interventions, and so attention ought to shift towards a budge-style intervention instead. As emissions from air travel increasingly contribute to climate change, this is a topic with growing importance for environmental regulation.

Future research might test if addressing the design barriers identified here might help in promoting offsetting. For example, it might be interesting to test offering carbon offsets at a separate point in time from the booking process, e.g. during or after a given flight, to remove the negative connotations customers have when offsetting at the point of purchase online. Testing the use of social media in promoting offsetting within peer networks could also be an interesting avenue. While such research might prove fruitful, this paper’s findings highlight some enduring, substantive barriers which suggest that carbon offsetting does not belong to a category of behaviours that are suitable for a nudge.

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# Appendix

## Screenshot of carbon offset website

