Low-Carbon Behavioural Spillover

Research and Practitioner Perspectives

January 2017

Executive Summary

Reducing carbon emissions in line with the scale of climate change requires profound societal and lifestyle change across the board. However, while attention to environmental issues has increased over recent years, significant lifestyle change has yet to be realised.

The CASPI project[1] was set up to investigate the potential for more comprehensive lifestyle change through 'behavioural spillover': the idea that doing one environmentally-friendly thing may also lead a person to act in other beneficial ways. CASPI is applying a mixed methods approach with members of the public in eight countries (including the UK, China and Brazil) to understand the different contexts and drivers of action.

In this report we share interim project findings, together with insights from practitioners from the private, public and charitable sectors who attended a roundtable discussion on behaviour change and spillover in November 2016, hosted by Cardiff University.

- Our in-depth public interviews and survey work suggests that, worldwide, 'environmental' issues and problems are understood in a multitude of ways – from the global scale to the context of immediate, local issues. Across seven countries surveyed, UK respondents were the least concerned about climate change.

- Most research participants undertake at least some environmentally-friendly action, though this is confined mostly to simple, individual-level behaviour. Almost all respondents to CASPI's UK survey (96%) switch off lights when not in use; however, a majority (83%) have never contacted a politician about an environmental issue.

- Public interviews reveal limited recognition of behavioural spillover in people's own lives. By contrast, practitioners did highlight occasions where spillover had been observed in their work, particularly where an initial activity was ambitious or highly visible – such as involvement in a community energy project or installing solar panels leading to other changes. Practitioners nevertheless stressed that people often did not see the links between different environmentally-friendly behaviours in their daily lives.

- Research participants tend to think those environmentally-friendly behaviours which are widespread – such as recycling and using energy-efficient lightbulbs – are also the most beneficial. Action in the public sphere – such as supporting an environmental campaign group or signing petitions – is, by comparison, considered to be less impactful.

- Practitioners suggested that the visibility of environmentally-friendly behaviour can be an important spur to further change. Conspicuous action can add to a tangible sense of action, as well as conferring a sense of collective effort.

- Practitioners identified social interaction and community support as critical to achieving broader action on the environment. Those present at the roundtable spoke of the need to normalise environmentally-friendly behaviour and to move away from individualistic and 'worthy' framings of action.

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[1] Low-Carbon Lifestyles and Behavioural Spillover (CASPI) project, based at Cardiff University.

About the report

As part of the Low-Carbon Lifestyles & Behavioural Spillover (CASPI) project, a major international research project funded by the European Research Council (ERC), Climate Outreach and researchers at Cardiff University convened a one-day Roundtable in Cardiff in November 2016, bringing together a range of policy and non-governmental practitioners working on low-carbon and pro-environmental behaviour change.

The aims of the workshop were:

- To learn and reflect on different practitioner perspectives on 'spillover' and low-carbon behaviour change
- To present and discuss early key findings from the CASPI project
- To apply knowledge generated from the day to practitioners' ongoing projects
- To inform the next phase of the CASPI project with insights and comments from Roundtable participants
- To build links and an informal knowledge-sharing network among Roundtable participants
- To produce a Briefing Note for Roundtable participants and their wider networks – comprising the latest thinking on spillover and low-carbon behaviour change.

About the CASPI project

The CASPI (Low-carbon Lifestyles and Behavioural Spillover) project is about how environmentally-friendly behaviour, lifestyles and spillover are understood and develop within different cultures. In particular, it tests whether and when behavioural 'spillover' happens – in other words, whether taking up one new green behaviour (e.g., recycling) leads on to other green behaviours (e.g., taking your own bags shopping), and if so, under what circumstances.

This research is prompted by the need to make profound changes to individual behaviour in order to tackle climate change, where policies to achieve these changes have so far met with limited success. We are interested in green lifestyles in the round – moving beyond small-scale and piecemeal approaches to behaviour change. If we find spillover is feasible, this could be a cost-effective method contributing to the mitigation of climate change. Equally, it could help address other societal problems (e.g., obesity, crime) that rely on changing behaviour. The ERC awarded €1.5m for this five-year (2014-2019) programme of research. Further details are given below and at: http://sites.cardiff.ac.uk/caspi/.

About Climate Outreach

Climate Outreach (formerly COIN) is a charity focused on building cross-societal acceptance of the need to tackle climate change. They have over 10 years of experience helping our partners to talk and think about climate change in ways that reflect their individual values, interests and ways of seeing the world. Their role in the project has been to convene and facilitate the CASPI Roundtable event.

Roundtable team

Prof. Lorraine Whitmarsh is an environmental psychologist, specialising in perceptions and behaviour in relation to climate change, energy and transport, based in the School of Psychology at Cardiff University. She is also partner coordinator for the Tyndall Centre for Climate Change Research. She regularly advises governmental and other organisations

on environmental behaviour change and communications. Her research projects have included studies of energy efficiency behaviours, electric vehicle use, carrier bag reuse, perceptions of smart homes and smart grids, and responses to climate change.

Dr. Stuart Capstick is a Research Fellow in the School of Psychology at Cardiff University. He is interested in people's understanding of environmental problems and ways of promoting sustainable lifestyles. He has published on topics such as the links between personal experience and responses to climate change; public perceptions of ocean acidification; international dimensions of attitudes towards climate change; and the prospects for achieving more far-reaching emissions reduction through behaviour change.

Dr. Nick Nash is a Research Fellow in the School of Psychology at Cardiff University. His background is in social and environmental psychology, specifically the use of qualitative and discursive methods to investigate relationships between people and their surroundings. Current research interests include cross-cultural perceptions of pro-environmental behaviour, and public responses to energy technologies, risks and siting issues.

Prof. Wouter Poortinga is Professor of Environmental Psychology at the Welsh School of Architecture and the School of Psychology, Cardiff University. His research interests are in psychological and social dimensions of climate change and energy issues, sustainable behaviours and lifestyles, and human-environment interactions. Wouter currently leads a project on behavioural and attitudinal impacts of the English plastic bag charge, examines the health impacts of energy-efficiency improvements, and contributes to two projects on European perceptions of climate change.

Dr. Adam Corner is the Research Director at Climate Outreach, and an Honorary Research Fellow at the School of Psychology, Cardiff University. Adam manages Climate Outreach's research portfolio and directs Climate Outreach's collaborations with academic partners. He writes regularly for the national media, including The Guardian and New Scientist magazine.

Anna Stone is Project Coordinator at Climate Outreach. Anna has expertise in supporting and coordinating research projects through her work with several international NGOs and time at the University of Southampton. She has developed a particular interest in communication strategies for disaster risk reduction, in response to the impacts of climate change, from her studies and work with Y Care International.

Part 1   Background

International leaders agreed in Paris 2015 to limit global warming to 2°C above pre-industrial levels. Alongside domestic UK climate change obligations to reduce carbon emissions by 80% by 2050, compared to 1990 levels, this implies profound changes to our society[2]. Lifestyle change will be a critical component of creating a low-carbon, sustainable society. Yet, to date, individuals have done little to reduce their carbon emissions[3].

Behaviour change interventions historically have tended to adopt piecemeal approaches and have focussed more on 'consumer' behaviours (e.g., saving energy in the home, buying 'greener' products), than on more collective or political activities, or behaviours outside the home (e.g., in workplaces). Behaviour change research and practice is well-versed in achieving 'small and painless' emissions reductions of a few percent; but less is known about how to achieve the scale of emissions reductions required to avoid dangerous climate change. Our previous work[4] indicates that radical behaviour change requires targeting interventions to:

- High carbon-emitting *groups* (e.g., high earners, sub-urbanites)
- High carbon-emitting *behaviours* (e.g., food, leisure/recreation)
- Context change *moments* (e.g., relocating), where habits and established routines are disrupted
- *Organisational practices* – e.g., one telecommuting scheme led to 66% drop in vehicle miles[4]
- *Multiple* behaviours (e.g., via behavioural spillover).

It is this final point in particular which the CASPI project aims primarily to address. Behavioural 'spillover' occurs when doing one green behaviour (e.g., recycling) leads to other green behaviours (e.g., taking your own bags shopping). We are interested in exploring when and why spillover occurs, and also – more broadly – examining sustainable lifestyles across different cultures.

Recent years have witnessed growth in both policy and academic interest in the potential of behavioural spillover. From a policy perspective, spillover appears to hold the promise of changing a suite of behaviours in a cost-effective manner with reduced need for regulation. There are also good theoretical reasons and growing empirical evidence to suggest that behavioural spillover does, under certain conditions, occur. First, there is some theoretical support from models of behaviour suggesting that people act in accordance with generally held values or goals across different situations or settings[5]. Furthermore, several social psychological theories support the notion that one behaviour may trigger another; these include the theories of *cognitive dissonance*[6] and *self-perception*[7], which highlight the psychological drive for behavioural consistency. A substantial literature provides evidence that people can be motivated to change their behaviours to achieve

[2] Allen, P., Blake, L., Harper, P. et al (2013). Zero Carbon Britain: Rethinking the Future. Centre for Alternative Technology. http://www.zerocarbonbritain.org/images/pdfs/ZCBrtflo-res.pdf

[3] Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. Journal of Environmental Psychology, 29, 13-23.

[4] Capstick, S., Lorenzoni, I., Corner, S. & Whitmarsh, L. (2014). Social science prospects for radical emissions reduction. Carbon Management, 4(5), 429-445.

[5] Keizer, K. et al. (2008). The spreading of disorder. Science, 322, 1681-1685.

[6] Festinger, L. (1957). A Theory of Cognitive Dissonance. Stanford University Press.

[7] Bem, D. (1967). Self-perception: an alternative interpretation of cognitive dissonance phenomena. Psychological Review, 74, 183–200.

consistency[8]; evidence also suggests that people infer their own attitudes or identity by observing their previous behaviour, triggering subsequent behaviour change in line with their perceptions[9]. The classic 'foot-in-the-door' technique has been shown to work on this principle of consistency: if an individual is issued with a request to perform an easy task (e.g., putting a sticker in their window to advertise a recycling program), they are more likely to comply with a subsequent, more demanding, request (e.g., addressing a large pile of envelopes), than if they are only asked to do the subsequent, demanding action[10].

Positive spillover, where one green action leads to other green actions, can in turn be divided into spillover *across behaviours* (e.g., recycling leading to avoiding composting)[11] and *across situations* (e.g., turning off lights at home and at work)[12]. This is distinguished from *negative* spillover, where performing a green action makes it *less* likely one will do something else green. This is often due to a '*moral licensing*' effect, whereby a person may feel, following one green action, that they have 'done their bit' for the environment and are subsequently entitled to act in less environmentally-friendly (or even more selfish) ways[13]. This is often observed in the context of health behaviours, where doing exercise has been found to lead people to subsequently choose unhealthy over healthy snacks.[14]

Research suggests that positive spillover is more likely to happen under certain conditions:
1. When the *initial behaviour* is *intrinsically* motivated (i.e. when an action is perceived to be due to free choice, rather than the result of external pressure or coercion (*extrinsic* motivation);
2. When the *initial* behaviour is performed with the intent of being environmentally-friendly; and
3. When the *initial* and *subsequent* actions are seen as *sufficiently similar* (i.e., they are conceptually linked in people's minds as being environmentally-friendly)[15].

There are thought to be different routes through which spillover from one behaviour to another works: for example, doing something environmentally-friendly may activate pro-environmental goals or values (i.e., reminding you of your environmental ethics or ambitions). Doing something environmentally-friendly may also promote a sense of green identity (i.e., lead you to see yourself as environmentally-friendly as a result of performing that behaviour); or via developing skills, knowledge and self-efficacy (i.e., by learning and gaining experience that can be transferred to other behaviours)[16].

As yet, the evidence appears to be mixed as to whether positive spillover is more likely if you start with an easier or more difficult request. The foot-in-the-door technique assumes the need for an initial easy behaviour (which is more likely to lead to compliance) before making a more demanding request; but recent work suggests that a moral licensing effect is more likely to occur when the initial behaviour is easy; therefore, positive spillover

[8] Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behaviour. Journal of Environmental Psychology, 24, 93–103.

[9] Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behaviour. Social Psychology Quarterly, 55, 388–399

[10] Scott, C. A. (1977). "Modifying Socially-Conscious Behavior: The Foot-in-the-Door Technique". Journal of Consumer Research. 4 (3): 156

[11] Thøgersen, J. (1999). Spillover processes in the development of a sustainable consumption pattern. Journal of Economic Psychology, 20, 53-81.

[12] Littleford, C., Ryley, T. & Firth, S.. (2014). Context, control and the spillover of energy use behaviours between office and home settings. Journal of Environmental Psychology, 40, 157-166.

[13] Mazar, N., & Zhong, C-B. (2010). Do green products make us better people? Psychological Science, 21, 494-498.

[14] Dolan, P.& Galizzi, M.M. (2014) Because I'm worth it: a lab-field experiment on the spillover effects of incentives in health. CEP Discussion Papers, CEPDP1286. Centre for Economic Performance, LSE, London.

[15] Austin, A. et al. (2011). Exploring catalyst behaviours. Report to DEFRA. Brook Lyndhurst.

[16] Thøgersen, J., (2012). Pro-Environmental Spillover Review of Research on the Different Pathways Through Which Performing One Pro-Environmental Behaviour Can Influence the Likelihood of Performing Another. BehaviourWorks Australia.

may be more likely if the initial request is for a more demanding action.[17]

Critically the evidence base for spillover is, so far, limited. Indeed, a 2009 WWF[18] report cautioned against environmental campaigners relying on spillover as an inevitable consequence of targeting 'simple and painless' actions:

"… there simply isn't the empirical evidence to justify reliance upon spillover from simple and painless steps into more difficult and potentially environmentally significant behavioural change (p.3)."

Other sources criticise the concept of 'green behaviour' and question the assumption that people *would seek to* be consistent when, in everyday life, multiple contextual factors (e.g., cultural norms, infrastructure, product availability) are often much stronger influences on our behaviour than psychological factors, like values or identity[19]. Indeed, correlational studies show that people are not very consistent when it comes to green behaviours[20], and employ a range of strategies to explain away their apparent behavioural inconsistencies[21].

Certainly, it would seem that spillover needs to be tailored, or 'designed in' to interventions to increase the chances that it will occur. Indeed, without considering wider behavioural relationships within a given context, it is possible that interventions may inadvertently suppress positive spillover or even produce negative spillover effects. For example, we found that the Welsh carrier bag charge, while very effective in encouraging people to take their own bags to the shops, did not lead to an appreciable change in any other waste or pro-environmental behaviours[22]. Rather, it seems that it may have suppressed spillover to other (energy-saving) behaviours, which were observed in places without a carrier bag charge, probably because the charge acted as an extrinsic motivator to change behaviour (i.e., people took their own bags to avoid paying the imposed charge, rather than out of environmental concern)[23]. Along with other research on values and behaviour change[24], this serves as a caution against targeting environmental campaigns on the basis of self-enhancing (e.g., money-saving) motivations.

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[17] Truelove, H., Carrico, A.,Weber, E., Raimi, K., & Vandenbergh, M. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. Global Environmental Change, 29, 127-138.

[18] WWF (2009). Simple and painless? The limitations of spillover in environmental campaigning. WWF, Woking.

[19] Shove, E. (2010). Beyond the ABC: climate change policy and theories of social change. Environment & Planning A, 42, 1273–1285.

[20] Whitmarsh, L. & O'Neill, S. (2010). Green identity, green living? Journal of Environmental Psychology, 30, 305–314.

[21] Barr, S., Shaw, G., Coles, T., & Prillwitz, J. (2010). "A holiday is a holiday": practicing sustainability, home and away. Journal of Transport Geography, 18(3), 474–481.

[22] Poortinga, W., Whitmarsh, L. & Suffolk, C. (2013). The introduction of a single-use carrier bag charge in Wales: Attitude change and behavioural spillover effects. Journal of Environmental Psychology, 36, 240-247.

[23] Thomas, G., Poortinga, W., & Sautkina, E. (2016). The Welsh Single-Use Carrier Bag Charge and behavioural spillover, Journal of Environmental Psychology 47, 126-135.

[24] Evans, L. Maio, G.R., Corner, A., Hodgetts, C.J., Ahmed, S. & Hahn, U. (2012). Self-interest and pro-environmental behaviour, Nature Climate Change. http://dx.doi.org/10.1038/nclimate1662.

Part 2   Interim CASPI Project Results

CASPI's Objectives & Methods

The CASPI (Low-carbon Lifestyles and Behavioural Spillover) project is about how environmentally-friendly behaviour, lifestyles and spillover are understood and develop within different cultures. In particular, it tests whether and when behavioural 'spillover' happens, and if so, under what circumstances. The research involves a mixed-method, cross-cultural study of pro-environmental behavioural spillover in order to open up new ways of promoting sustainable lifestyle change and significantly broadening our understanding of behaviour within both individuals and cultures.

There are three objectives for the research project:
1. To examine ways in which environmentally-friendly behaviour, lifestyles and spillover are understood and develop within different cultures;
2. To understand drivers of behavioural consistency and (positive and negative) spillover effects across contexts, including home and work, roles, and cultures; and
3. To develop a theoretical framework for behavioural spillover and test interventions to promote spillover across different contexts and cultures.

Three main types of methods are being used to address these objectives:
1. **Interviews and card sort exercises** to define and environmentally-friendly behaviour, lifestyles and spillover across cultures [Years 1-2].

    We have conducted 219 interviews across seven countries (Denmark, UK, Brazil, Poland, China, Nepal and South Africa, selected to represent different cultural 'types'[25] and levels of development[26].
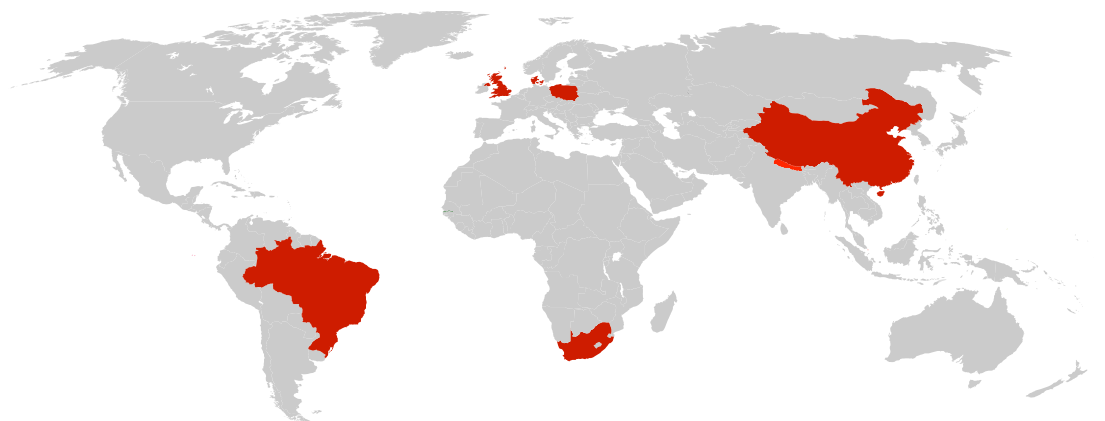

Figure 1. Countries selected for the interview stage

Interviews were undertaken with both environmentally committed and non-committed individuals, recruited through a range of methods (including local advertisements and contacts in environmental organisations). Interviews addressed individuals' understanding of and motivations relating to a range of environmentally-friendly behaviours. Two 'card sort' exercises (see Fig.2) explored participants' understanding of the relatedness of a range of 32 pro-environmental behaviours (card sort 1), and an assessment of their

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[25] Schwartz identified seven cultural types, from which we selected one country: Western Europe, English-speaking, Latin American, East European, Confucian, South Asian, and M-East & Africa. See: Schwartz, S. H. (1992). Universals in the content and structure of values: Theory and empirical tests in 20 countries. In M. Zanna (Ed.), Advances in experimental social psychology (Vol. 25, pp. 1-65). New York: Academic Press.

[26] Sen A, & Anand S. (1994). Human Development Index: Methodology and Measurement. New York: Human Development Report Office Occasional Paper 12.

perceived difficulty and environmental benefit (card sort 2). These behaviours included 'private-sphere' (e.g., consumption of green products) and 'public-sphere' (e.g., political activism) actions.
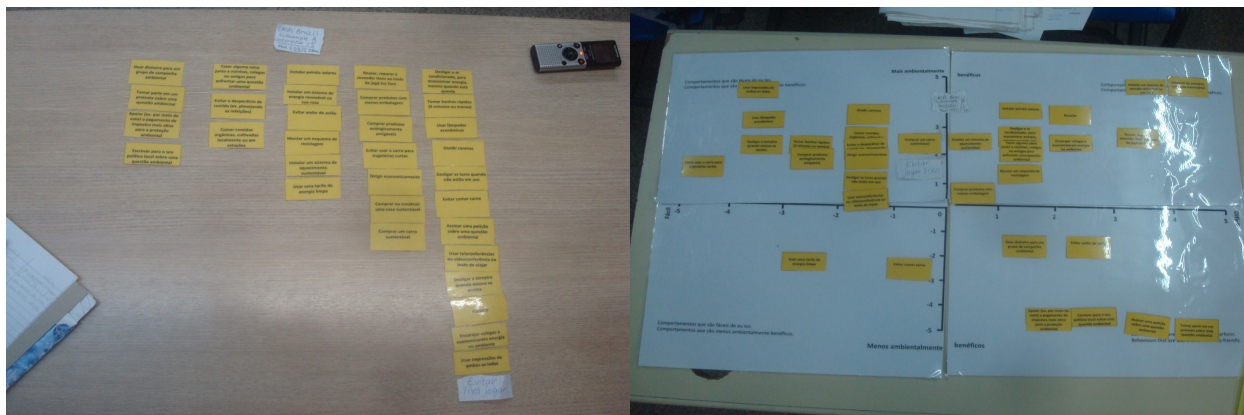

Figure 2. Card sort exercises conducted during the interview stage

2. **Cross-national survey** to examine influences on pro-environmental behaviour and spillover effects across contexts and cultures [Years 2-3]. We are currently undertaking online surveys with broadly representative (N=1,000) samples of the public in seven, culturally-diverse countries. These are the same countries as we sampled for the interview stage, except that we substituted Nepal for India due to greater internet access in the latter.

3. **Laboratory and field experiments** to develop theory and test interventions to promote spillover across different contexts and cultures [Years 3-5].
   We have started to conduct pilot lab experiments to test ideas about how spillover works. These include trying to 'prime' pro-environmental self-identity, in other words, getting people to feel they are a 'green person' and therefore want to act consistently with this self-image. We plan to develop this work in the second half of the project and launch one or more field studies to try and produce spillover in a 'real-world' setting.

CASPI's Interim Results

Since the project started in 2014, we have completed the interview stage and collected all of the survey data. For the remaining two years, we will complete the survey analysis and undertake a series of lab and field experiments. Here, we outline the findings from the interview stage and initial survey findings, focusing particularly on the UK sample.

Interview stage

Interview findings suggest 'the environment' is understood in a range of ways, including through both *global framings* (e.g., with reference to climate change), as well as more local framings (e.g., with reference to local urban housing development). When asked about the things they did in order to benefit the environment, most participants' responses were limited to descriptions of limited small-scale actions. Behaviours were embedded in the context of widely-diverging everyday lifestyles that enabled or constrained environmentally-friendly actions. Spillover was not a concept which participants recognised or identified with, but when prompted some (mainly the more environmentally-committed participants) described undertaking similar actions within the same behavioural context (e.g., gardening leading to taking additional measures to encourage wildlife), after an initial interest had been sparked.

The first card sort asked participants to group together 32 green behaviours in ways that made sense to them. Analysis indicated a number of common rationales for grouping behaviours, comprising degree of *choice* (e.g., things I can/would do vs. things I cannot/would not do), *sociality* (e.g., personal vs. social/political), degree of *impact* (e.g., large vs. small impact on environment), *context* (e.g., home, work), and conceptual *category* (e.g., food, shopping, energy, transport). Environmentally committed individuals tended to identify more categories than less committed individuals.
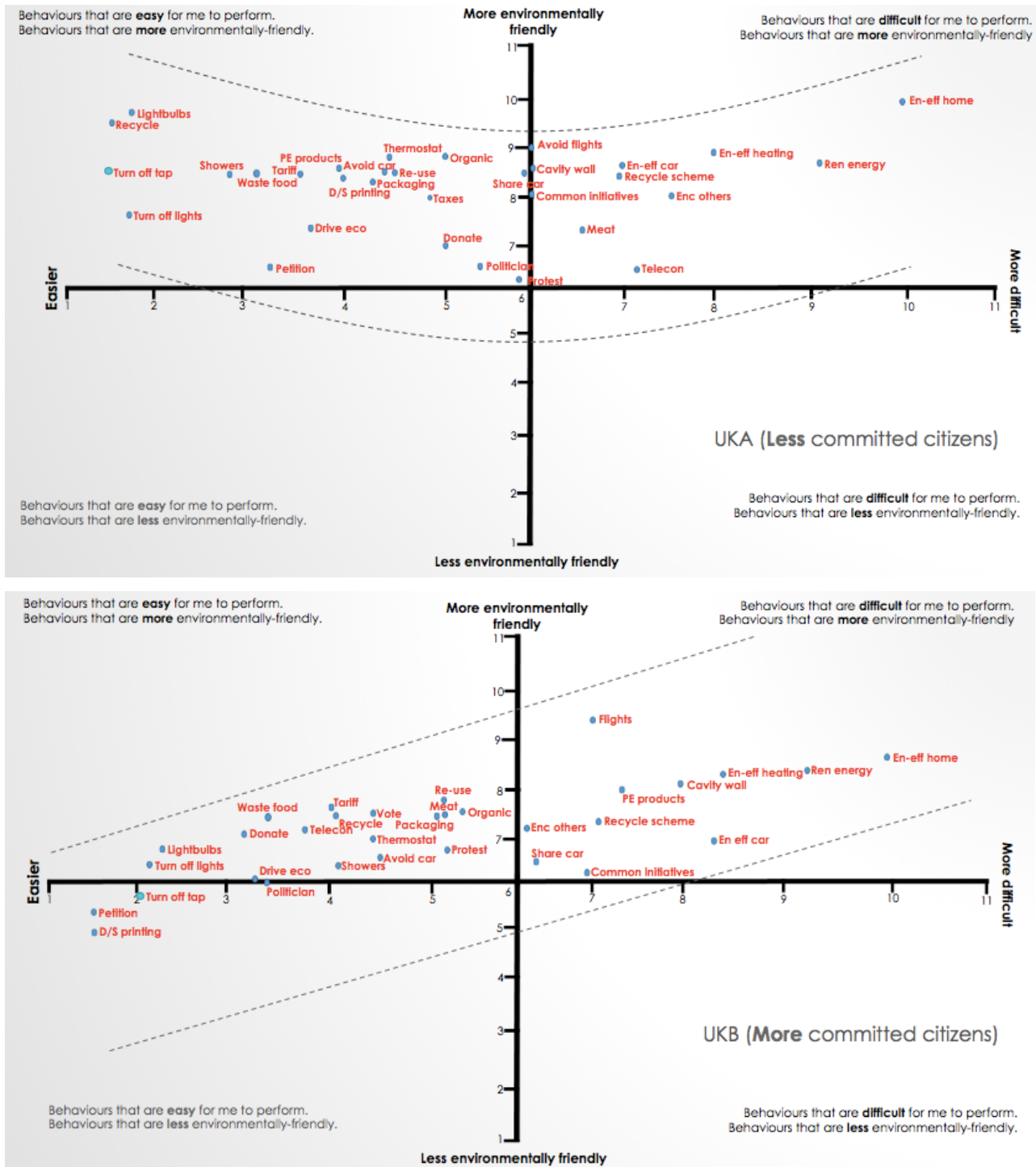

Figure 3. Participants' ratings of impact and difficulty of pro-environmental behaviours: less environmentally committed (top) and more committed (bottom)

The second card sort asked participants to place the behaviours on a two-dimensional matrix indicating how environmentally beneficial and how difficult they considered each

behaviour to be. Analysis of this card sort reveals that participants who were more environmentally-committed placed behaviours in characteristically different ways to those who were less committed (Fig.3). In particular, it seems that less committed individuals rate the 'simple and painless' behaviours which most people already do (e.g., recycling) to be as impactful as the more challenging behaviours (e.g., buying an energy-efficient home). On the other hand, there is more variation (and greater accuracy) in the impact ratings of the more committed individuals, whereby simple and painless behaviours were rated as being less impactful than the more challenging actions.

Survey stage

The survey aimed to achieve a demographically representative sample across the seven countries and included questions on:

- Beliefs and attitudes towards sustainability and climate change
- Psychological measures e.g. values, norms, identity, motivations
- Perceptions and action across private and public sphere
- Behavioural spillover
- Demographic and socioeconomic measures (e.g. income, religion)

An initial question sought to elicit spontaneous understandings of the environment. Analysis (Fig.4) suggests that the UK sample was particularly likely to think of global warming, whereas other countries (e.g., India) identified more local issues like pollution. Despite this, it appears our UK sample is amongst the least likely to believe in or be concerned about climate change (Fig.5).
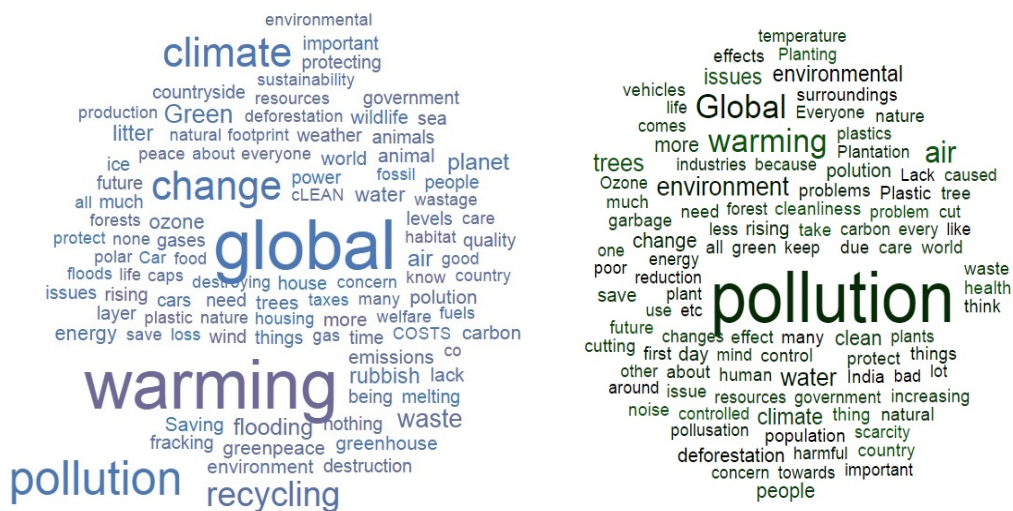

Figure 4. Spontaneous understandings of environment: 'What is the first thing that comes to mind when you think of environmental issues?' UK (left) and India (right)
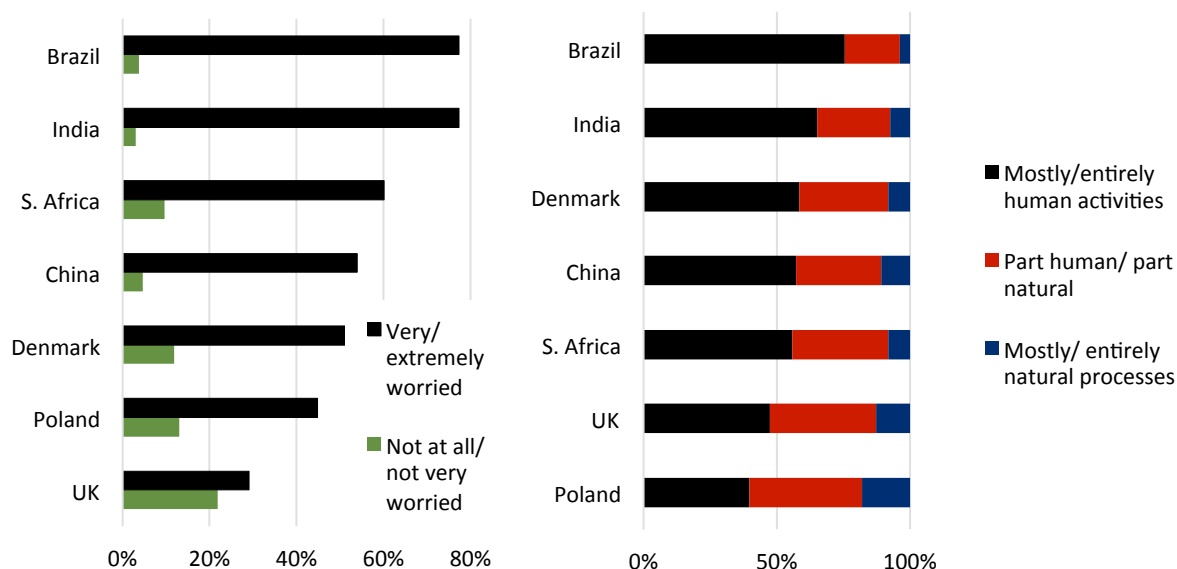
Figure 5. Concern and belief about climate change

The UK sample was also the most likely to feel their contribution to improving the environment was 'about the right about' (Fig.6).
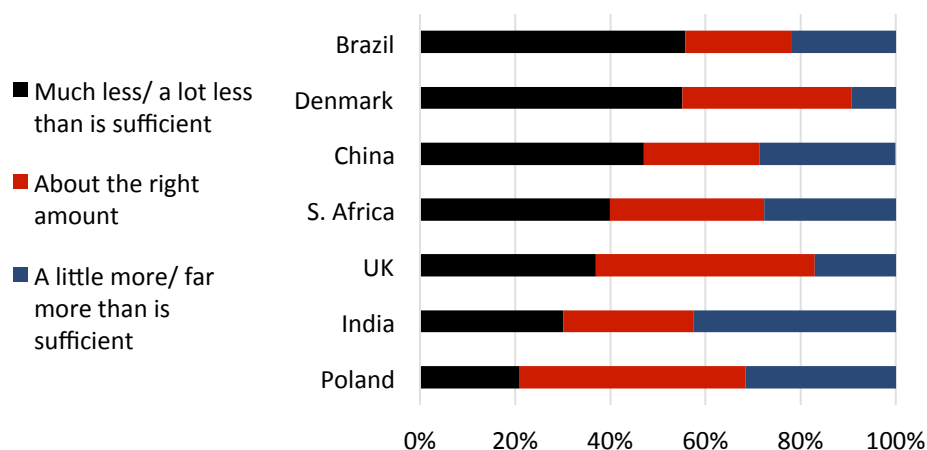

Figure 6. "To what extent do you feel that your personal contribution to improving the environment is sufficient?"

Participants were asked about the environmental impact of different actions and whether they were taking these actions. Consistent with the less committed sample from the interview stage, we find UK respondents rate 'simple and painless' behaviours like recycling and turning off lights to be the most environmentally beneficial, while harder (and particularly political) actions are considered less beneficial (Fig.7). Strikingly, the behaviours which are rated as being most beneficial are also those which individuals are most likely to regularly take (Fig.8).
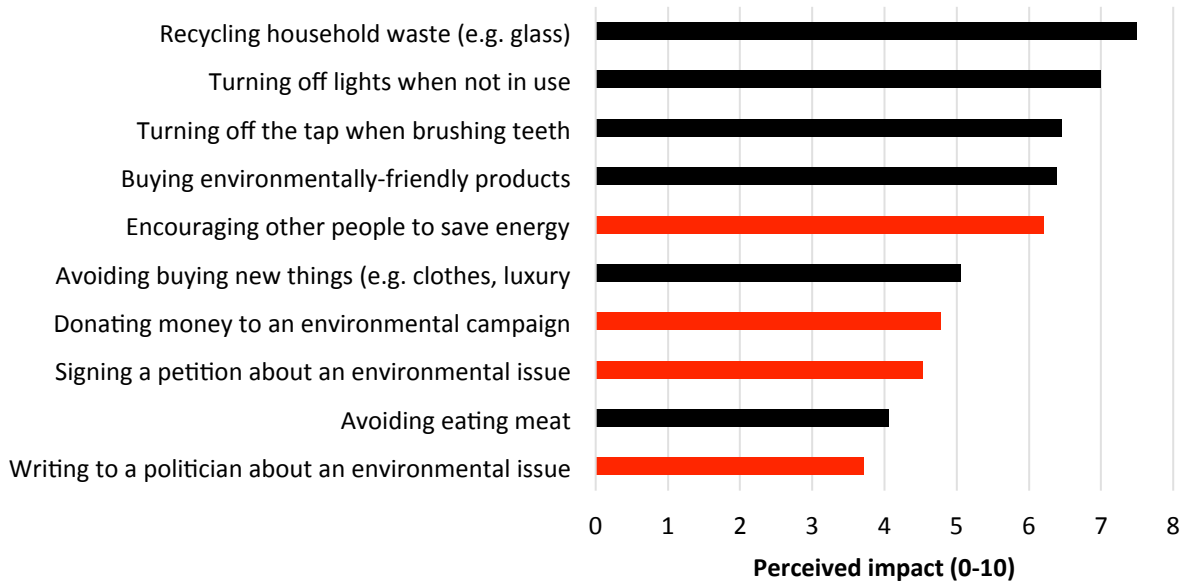
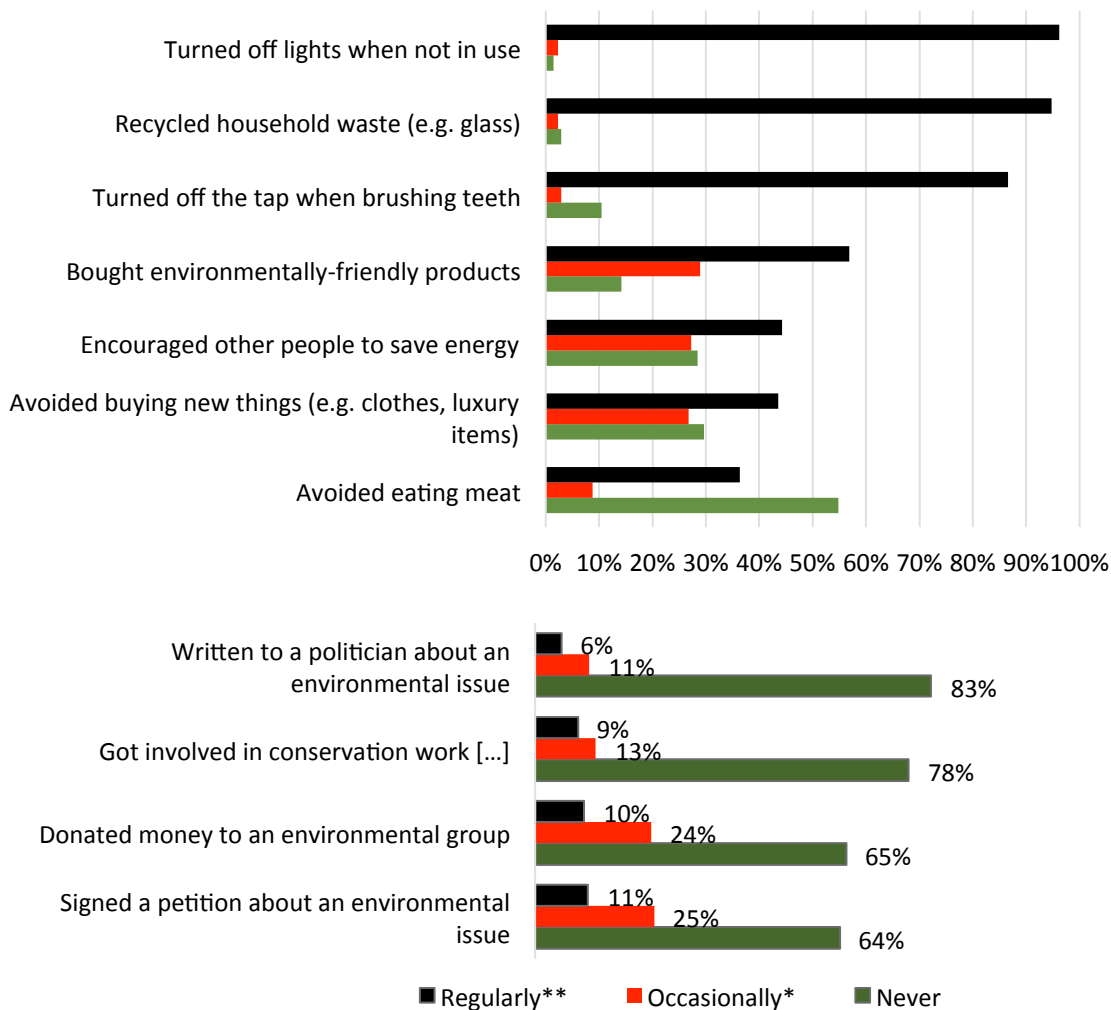*Figure 7. Perceived impact of pro-environmental behaviours*

Figure 8. Frequency of taking pro-environmental behaviours ('In the last 12 months, have you…'
***Regularly: once/month or more; * Occasionally: less than once/month)*

Part 3   Perspectives on spillover & behaviour change

Workshop attendees shared their perspectives on behaviour change from their own work. There were **mixed recollections of behavioural spillover** amongst participants. Some had observed secondary effects from interventions (although not necessarily to additional *pro-environmental behaviours*), while others observed it was hard for people to see the links across behaviours. Examples were given of community renewables projects which had generated other community-oriented activities or interest in energy efficiency. In these cases, the initial 'behaviour' was an ambitious one and subsequent actions were more modest (consistent with previous work[27] in this area). The point was made that more visible changes (e.g., installing solar panels) can help motivate smaller changes as the visibility of pro-environmental action made people feel part of a collective effort. Indeed, **visibility** was seen as an important precondition for behaviour change: engagement with environmental issues was considered more likely where environmental *problems* were more *tangible* and environmental *actions* had a *clear effect* (e.g., in reducing waste).

Other examples provided by practitioners suggested that pro-environmental concern was in many cases not the primary **motivator of behaviour change**, nor of spillover, with *social support*, *health*, *comfort*, *having fun* or *financial benefits* often being more significant. This is consistent with research which shows that environmental concern itself is often not a strong driver of low-carbon behaviours[28]. One example was also provided of a campaign to explicitly draw attention to different sustainable waste behaviours, beyond recycling, (i.e., drawing on cognitive dissonance theory) that did not work because of perceived insurmountable barriers to changing these behaviours. This diversity of motivations was also evident from a segmentation study that one attendee's organisation had conducted, revealing that environmental action (even narrowly defined, e.g., charity support) can be linked to a range of motivations (e.g., animal welfare, health, environment). These experiences together suggest potential limitations of the spillover effect, where this is dependent on pro-environmental motivations; conversely, spillover across sustainable behaviours due to other motivations may have greater traction in producing spillover effects.

Barriers to behaviour change were mentioned by several participants. Lack of control was seen as a particularly important barrier for spillover, since adoption of new sustainable behaviours depended on being able to personally effect change (and behaviours in certain contexts, like workplaces, may be less under individuals' control). It was also argued that lack of resources or income could be a barrier to behaviour change, since those who are struggling to meet more immediate everyday responsibilities may be less motivated or able to think about more perceptually distant (for the UK, at least) issues like climate change.

A significant theme arising in the discussions related to **social interaction and support** from peers. People respond to, and take encouragement from, others within their social groups – in some cases creating an element of friendly competitiveness to motivate behaviour change. Trusted messengers were also highlighted as being important. For example, some communities may be particularly risk averse (e.g., those in fuel poverty) and suspicious of interventions seen as 'too good to be true'; whereas adoption of energy efficiency measures by friends or neighbours is likely to help overcome this perception and increase the chances of engagement. Similarly, others spoke of the need to 'normalise' and

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[27] Truelove, H., Carrico, A.,Weber, E., Raimi, K., & Vandenbergh, M. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. Global Environmental Change, 29, 127-138.
[28] Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. Journal of Environmental Psychology, 29, 13-23.

routinize pro-environmental behaviours and move away from the motivation of 'worthiness'. This discussion led to questioning around the individual framing of much spillover research, and suggested that 'social spillover' (e.g., within families or communities) might be an important area for future work. Another suggestion was that spillover may be 'technology-mediated' – for example, smart meters might lead to change in multiple energy use behaviours.

In response to the CASPI interim results, participants noted that collectivist **cultures** appear to be increasingly receptive to more social forms of engagement – and since the UK is a more individualistic country, this might explain the low willingness to go beyond simple, consumer-oriented environmental behaviours. The low uptake of other behaviours, such as avoiding eating meat, was thought in part to be due to low awareness of the environmental impacts of these actions; but also because there may be cultural, psychological or sometimes physical **barriers** to change.

Finally, the group was asked to consider how they might use the research in their own work. There was considerable interest in conducting **segmentation** analysis on the survey data to explore the types of people (including different age groups) who adopt different pro-environmental behaviours and potentially inform attendees' campaigns and interventions. Others also asked whether we might be able to identify particular **spillover traits** within different segments (e.g., age groups); or particular **behaviours** which might be most likely to catalyse spillover. There was also an interest in linking uptake of pro-environmental behaviour with analysis on the actual environmental **impact** of these behaviours. This might help in visualising and communicating impact to inform behaviour change. There was enthusiasm for exploring the role that installing solar panels might play in spillover (either before or after installation).

The workshop appeared to raise awareness that spillover is unlikely to occur naturally, and that it would probably need to be designed into interventions, though there was some doubt that using pro-environmental motivations was likely to be the most effective route to behaviour change. The notion of spillover also raised the possibility of designing (spillover) interventions that involve **multiple organisations** – i.e., targeting several behaviours in a more holistic way. It was also pointed out that changing multiple behaviours (at the same time, rather than sequentially) is more likely during '**moments of change**', such as moving house, starting a family, or retiring.[29] There was a clear sense that more research was needed on spillover and how to trigger it before it can be reliably integrated into intervention design. This research might help clarify whether spillover can occur without specific interventions; the barriers to spillover; and whether behaviour change influencing attitudes (e.g., policy support) counts as spillover. Indeed, some felt the concept of spillover should be broadened to include *any* process of pro-environmental engagement *spreading* across behaviour, attitude, policy preferences, contexts and/or individuals. In this sense, spillover then becomes an increase in consistency with respect to the environment, rather than one behaviour triggering another behavioural change.

Overall, the discussions demonstrated that spillover is complex and multi-layered as a concept; and it is difficult to demonstrate in practice. It doesn't easily 'happen' unless various different factors are in place, including identity, trust (social capital), interpersonal engagement and social norms, 'cognitive bandwidth' (lower income families or

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[29] Thompson, S., Michaelson, J., Abdallah, S., Johnson, V., Morris, D., Riley, K., & Simms, A. (2011). "Moments of change" as opportunities for influencing behaviour: A report to the Department for Environment, Food and Rural Affairs. nef (the new economics foundation). Defra, London.

individuals may have other concerns), awareness, self-efficacy (the sense that a lifestyle change is possible), and an absence of structural barriers (lack of income, time, agency, flexibility). There are some positive examples in practice where spillover type processes seem to have occurred. There was strong positivity towards attendees sharing resources, and developing more active collaboration with the research team including gaining insights into behaviour change (e.g., via segmentation).

Part 4   Concluding Remarks

Behavioural spillover offers potential as an alternative to piecemeal behaviour change campaigns, by targeting multiple behaviours in order to bring about wider shifts in lifestyles. The literature on behavioural spillover has emphasised the importance of behavioural consistency via pathways relating to goals and values, identity and knowledge and self-efficacy as underpinning spillover processes. Furthermore, previous research has found that spillover effects are more likely when initial behaviours are intrinsically-motivated and done for environmental reasons, and when the initial and subsequent behaviours are perceived as being closely related.

Interim CASPI research findings and researcher and practitioner perspectives converge in highlighting the complex and contingent nature of processes of spillover effects and pro-environmental behaviour change. What comes out of the Roundtable discussion is the importance of environmental understandings, perceptions of behaviours (and their relatedness), and specific psychological, physical and cultural barriers and catalysts to spillover.

The interim interview and survey analyses from the CASPI project suggest that perceptions of environmental issues are varied and nuanced, e.g., encompassing multiple spatial levels. In addition, there are important distinctions in the ways that environmentally-friendly actions are understood, particularly with particular relevance to the perceived environmental benefit of those behaviours.

In terms of behaviour change interventions, the findings highlight the importance of both general environmental understandings in addition to evaluations of individual behaviours. Therefore, tailoring interventions by attending to both environmental understandings (e.g., how behaviours address specific environmental problems) and behavioural perceptions (e.g., the impact of specific actions) might go some way toward increasing the relevance and value of adopting a given environmentally-friendly behaviour. This is reflected in practitioners' comments asserting that the links between behaviours are not always recognised by people.

In addition, it may be worth considering broadening intervention messages beyond environmental motivations, to incorporate factors relating to social, health and hedonic reasons for behaviour change. While previous work has found pro-environmental motivations to be more likely to lead to behavioural spillover than self-enhancing motivations, it appears evident from practitioners' comments that environmental concern is not always the most important reason for a new behaviour being adopted.

It is also paramount to take into account the psychological, physical and cultural barriers to behaviour change that can negate interventions before they begin. In line with practitioners' reflections, the degree of agency a person feels they have, access to resources, and cultural values and practices may constrain the potential for behavioural spillover taking place.

In summary, discussions suggest the broadening of existing understandings of spillover, from a mechanistic process governed by identifiable and consistent relationships, to a more nuanced view in which spillover is dependent not only on perceptions and relationships between behaviours, but also on the wider contexts in which those behaviours occur.

In terms of next steps, discussions raise significant potential for testing interventions in laboratory and field studies. For example, there is scope to examine whether providing information about the salience and impacts of behaviours through tailored messaging, could increase the likelihood of positive behavioural spillover. Interventions might also seek to strengthen or moderate the links between behaviours in various ways in order to catalyse further behaviours. Interventions might also seek to manipulate understandings of the initial behaviour (e.g., in terms of attribution, reasons for performing, as well as similarity to other behaviours). Such interventions would appear to fit well with more holistic interventions targeting suites of behaviours, or where certain interventions work more effectively with some social groupings than others.