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WHICH EFFICACY CONSTRUCTS FOR LARGE-SCALE SOCIAL DILEMMA PROBLEMS? INDIVIDUAL AND COLLECTIVE FORMS OF EFFICACY AND OUTCOME EXPECTANCIES IN THE CONTEXT OF CLIMATE CHANGE MITIGATION.

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Introduction

The Earth's population is at the point of crossing the threshold of 7 billion people and United Nations projections estimate that the population will rise to 9 billion by 2050. It is currently unclear whether the Earth's ecosystems will be able to sustain such large numbers, at least assuming continuation of or improvement upon current standards of living. A particularly critical sustainability problem with potentially catastrophic outcomes is posed by climate change. Human activities contribute to climate change primarily in the form of greenhouse gas emissions resulting from energy use for heat, electricity and transport, and management of energy use is therefore crucial.

Growing recognition of the risks associated with climate change has led to important policy responses including the *Kyoto Protocol to the United Nations Framework Convention on Climate Change* (UNFCCC) and the more recent *Cancún Agreement*. The tendency in most policies has been to set climate change targets to be achieved over the long term (10-50 years). However, because CO₂ remains in the atmosphere for 200–2000 years, climate change due to CO₂ emissions is largely irreversible for 1,000 years after emissions cease (Solomon et al., 2009). This means that the longer CO₂ continues to be emitted at current rates, the larger the total carbon burden and the harsher future cuts will need to be in order to avert the worst consequences. Anderson et al. (2008) argue that the time lags involved in converting to sustainable energy supply make end-user energy demand reduction the only viable strategy for reducing CO₂ emissions in the short term. Risk management through behaviour change therefore has a vital role to play in climate change mitigation.

Despite the acknowledged need for immediate action and government calculations that energy consumption by private individuals accounts for 51% of the total energy use of the UK (Hillman and Fawcett, 2004), the evidence demonstrates that the UK public currently shows very low engagement with mitigating actions (Ockwell, et al., 2009; IPCC, 2007) and energy use is actually rising (Whitmarsh, 2009). There is therefore an urgent requirement to increase engagement with mitigating behaviours.

As part of broader strategies to limit the risks associated with climate change, involving structural changes and various forms of incentives, governments are demonstrating increasing interest in approaches to encourage behaviour change. However, the Science and Technology Committee's second report on *Behaviour Change* (2011) recently concluded

that our understanding of how to effectively influence behaviour at the population level remains underdeveloped. The situation is further complicated by the fact that in the context of climate change mitigation, behavioural choices take place in a social dilemma situation. Indeed, there are often personal gains from increased energy use (e.g. increased comfort when using more energy for heating); yet in the longer term, unrestrained energy usage at the collective level contributes to increased emissions and the negative impacts of climate change that affect both the individuals that contributed to it and the environment and society at large. The social dilemma nature of decisions about whether to engage in climate change mitigation behaviours makes the difficulty of encouraging action particularly acute.

A key area of psychological theory that has the potential to provide insight into population level behaviour change is that of *Social Cognitive Theory (SCT)*, originally developed by Bandura (1986b). This theory has been repeatedly demonstrated to have practical applications in predicting and influencing long-term behaviour change at an individual level, and has been applied in a wide variety of contexts, including health and pro-environmental behaviours. SCT involves two core psychological constructs known to influence behaviour: *self-efficacy*, which is concerned with people's beliefs in their capabilities to perform a specific behaviour; and *outcome expectancies*, which are concerned with people's beliefs about the likely consequences of their action (Luszczynska and Schwarzer, 2005). However, current SCT theory presents certain limitations for applications in large-scale collective problems, and particularly those that involve social dilemmas. Although the literature contains references to both individual and collective forms of efficacy and outcome expectancies, the terms are often poorly distinguished and theoretical distinctions remain weak.

The remainder of this paper is structured as follows. We begin by describing and evaluating existing SCT and efficacy theory. We then review the literature and identify the inconsistencies in efficacy and outcome expectancy constructs as applied to collective situations. Our analysis leads to the development of an integrated framework in the form of a matrix consisting of individual and collective forms of efficacy and outcome expectancies. The main aim of this framework is to allow those involved in designing risk management interventions to identify the forms of efficacy that are most problematic for particular climate change mitigation behaviours, such that these can be appropriately targeted by policy interventions. The framework also serves to focus future research efforts, and in the final section of this paper we identify several research questions, the answers to which will contribute to ensuring the effective operationalisation of the framework in a practical risk management context.

Efficacy is a useful construct for understanding individual behavioural choices in relation to climate change mitigation behaviours

Social cognitive theory

Social cognitive theory (SCT), first introduced by Bandura (1986b), provides a theoretical framework for understanding, predicting, and influencing human behaviour (Bandura, 1997). It has been shown to have predictive value in areas as diverse as school achievement, physical health and socio-political change (Luszczynska and Schwarzer, 2005) and its main constructs have recently begun to attract attention in studies of pro-environmental behaviour (De Groot and Steg, 2007; Lam, 2006; Lubell, 2002).

SCT involves two core constructs: *self-efficacy*, which is concerned with people's beliefs about their capabilities to perform a specific behaviour; and *outcome expectancies*, which are concerned with people's beliefs about the likely consequences of their action (Luszczynska and Schwarzer, 2005). Since there are limits to individuals' objective knowledge of their abilities and expected outcomes, SCT focuses on individual perceptions of these as mediators of behaviour (Strecher et al., 1986). Indeed, evidence from diverse lines of research reveals that perceptions in the form of efficacy beliefs function as important determinants of human motivation, affect, thought and action (Bandura, 1995). Nonetheless, efficacy beliefs do not function alone, but in conjunction with outcome expectancies, and specifically whether the latter are aligned with desired outcomes or goals (Luszczynska and Schwarzer, 2005). Particular behaviours are therefore enacted only when they are both viewed as possible, and are expected to achieve desired outcomes (e.g. Strecher et al., 1986).

Given the focus on perception of capabilities and consequences for predicting specific behaviours, self-efficacy and outcome expectancies are generally assessed using self-report measures (Bandura, 2006) which take the form of questionnaires that are used to collect quantitative data by asking participants to rate their level of agreement with a set of statements. Bandura (2006) provides guidance on how to construct reliable and valid instruments for measuring efficacy and outcome expectancies. In relation to self-efficacy, Bandura (2006) argues that efficacy is a judgement of capability and so statements should use the formulation *can do*, rather than *will do*, since the latter forms a statement of intention. Luszczynska and Schwarzer (2005) provide sample statements for efficacy based on the following formulation: 'I am confident that I can ... (perform an action), even if ...

(a barrier)' (p.148). Bandura (2006) argues that including the barrier component is important as 'efficacy should be measured against levels of task demands that represent gradations of challenges or impediments to successful performance' (p.311). In relation to outcome expectancy, the usual approach to measurement involves providing participants with statements that relate to the extent to which they agree or disagree that a stated outcome will occur as a result of a particular behaviour or task. For example, Luszczynska and Schwarzer (2005) provide a structure for outcome expectancy statements: 'If ... (a behaviour), then ... (consequences)' (p.148).

Response categories generally take the form of a Likert scale, although the number of categories and their labels differ between efficacy and outcome expectancies, as well as among authors. According to Bandura (1997), the standard methodology for efficacy measurement involves a 100-point scale, according to which individuals rate the strength of their efficacy beliefs according to 10-unit intervals ranging from 0 ('can not do') to 50 ('moderately certain can do') to complete assurance at 100 ('certain can do'). Bandura (1997) argued that wider scales should be preferred in that there are gains in both reliability and sensitivity when a larger number of categories are used. Nonetheless, authors vary in their use of response categories. For example, Luszczynska and Schwarzer (2005) provided a response scale from 1 to 4. Outcome expectancies are generally measured using a Likert scale with category labels running from 'totally disagree' to 'totally agree' (Williams and Bond, 2002) or from 'completely false' to 'exactly true' (Luszczynska and Schwarzer, 2005), although the number of categories differs among authors.

Evidence for the importance of self-efficacy for behaviours

Conner and Norman (2005) argue that one's self-efficacy beliefs determine whether actions will be initiated, how much effort will be applied, and the extent to which actions will be sustained when barriers arise. Indeed, empirical research shows strong support for a positive relationship between self-efficacy and different motivational and behavioural outcomes in clinical, educational and organisational settings (Stajkovic and Luthans, 1998). Further, Bandura (2002) discussed a range of large-scale meta-analyses which support this claim across diverse spheres of functioning including personal health management (Holden, 1992), sport performance (Moritz et al., 2000), academic performance (Multon et al., 1991) and work related performance (Stajkovic and Luthans, 1998).

Focusing more specifically on *changes* in behaviour, Bandura (1995) argues that the evidence for a close association between efficacy beliefs and behaviour change is overwhelming. Indeed, based on their review of health behaviour change studies, Luszczynska and Schwarzer (2005) concluded that 'the construct of perceived self-efficacy has been the most powerful single resource factor in predicting the process of behaviour change' (p.158). Furthermore, work on behaviour change in health contexts demonstrates not only short-term predictive value, but also a robust relationship between efficacy and long-term maintenance of behaviours (Strecher et al., 1986).

Evidence for the importance of efficacy in predicting behaviour change has led to its use in behaviour change interventions. According to Bandura (1977), four main influences on self-efficacy can be identified. In making self-efficacy judgements, individuals interpret their capabilities in relation to: a) their *enactive mastery experience* that consists of

interpretations of past personal experiences of the task or behaviour; b) their *vicarious experience* that leads to the appraisal of capabilities in relation to the achievement of others; c) *verbal persuasion* by others of their faith in the individual's capabilities; and d) their *physiological state*. Thus in general, having successful personal experiences of the task or behaviour, seeing others perform successfully, hearing others profess their faith in one's abilities, and being in a non-anxious physiological state, all contribute to more positive appraisals of one's own capabilities.

Each of these influences can be used to design interventions to enhance self-efficacy. Studies have examined the variables that have the greatest influence on self-efficacy beliefs. Interventions targeting enactive mastery experience have generally been shown to be the most influential as they provide observable evidence of one's own capabilities, with vicarious experience also having an important role in enhancing efficacy beliefs (Bandura, 1997; Luszczynska and Schwarzer, 2005).

The evidence reviewed above demonstrates that efficacy is an important predictor of both short-term behaviour change and the longer-term maintenance of behaviours, and that interventions aimed at increasing efficacy can have important effects on behavioural outcomes. These findings therefore point to the potential value of efficacy beliefs for risk management through behaviour change in the context of problems that require long-term maintenance of alternative behaviours, such as those required in the context of climate change mitigation. Although the studies described above focus on behaviour change in relation to individual problems (e.g. individual health), Kerr (1989) and Kollock (1998) hypothesise that self-efficacy could provide a key insight into large-scale and social

dilemma problems (Weber et al., 2004), and thus hint at applications for climate change mitigation.

Evidence for the importance of outcome expectancy for behaviours

Alongside efficacy, Gao et al., (2008) argue that outcome expectancies should also have an impact on behaviour, with positive outcome expectancies functioning as an incentive whilst negative expectancies can function as a disincentive to action. Although there has been less research on outcome expectancies than on the role of self-efficacy on behaviours (Gao et al., 2008), there is good evidence for the role of outcome expectancies in predicting behaviour. Specifically, this research points to the importance of outcome expectancies in the early stages of behaviour change and especially the initial formation of intentions (Conner and Norman, 2005; Bandura, 1986a; Williams et al., 2005). For example, Damush et al., (2001 cited by Williams et al., 2005) found that positive outcome expectancy resulted in increased attendance at an initial exercise class, but not in subsequent class participation, and Rodgers and Brawley (1996) report similar findings.

The interaction between self-efficacy and outcome expectancies

Bandura (1982) argued that behaviour is best predicted by considering both self-efficacy and outcome expectancies. Specifically, people tend not take action when they perceive themselves as unable to influence situations that affect their lives, but this inaction can spring from either low self-efficacy beliefs or low outcome expectancies (Bandura, 1982). In the cases where efficacy and outcome expectancies are aligned, high efficacy beliefs

combined with positive outcome expectancies can be expected to lead to action, productive engagement and personal satisfaction (Bandura, 1982, 1997); in contrast, low efficacy beliefs combined with low outcome expectancies lead to inaction and the belief that no amount of effort applied will produce the desired outcomes (Bandura, 1997). However, when efficacy beliefs and outcome expectancies are misaligned, the situation is more complex. The combination of high efficacy beliefs and low outcome expectancies does not necessarily lead to inaction, and under certain circumstances, can actually lead to increased efforts, through the adaptation of tasks to those that are believed to be more effective for attaining desired outcome (Bandura, 1982), for example by making tasks more challenging. However, low self-efficacy combined with high outcome expectancies is likely to lead to self-devaluation, as people may perceive themselves as inadequate (Bandura, 1997).

In empirical work, Williams and Bond (2002) found that self-efficacy showed a stronger relationship with behavioural outcomes in the context of diabetes self care when outcome expectancy beliefs were high. This effect was partially due to not only a positive relationship between high self-efficacy beliefs and better self care, but also to low self-efficacy beliefs and poorer self care, among participants whose outcome expectancies were high. In other words, the belief that the recommended behaviours will lead to desired outcomes was likely to promote self-care, but only when combined with high self-efficacy beliefs (Williams and Bond, 2002).

Furthermore, the joint role of efficacy and outcome expectancy is particularly important when the recommended behaviours do not guarantee positive outcomes (Bandura, 1977). For example, Strecher et al., (1986) suggested that health behaviours which are not difficult

to change but whose outcomes are perceived as being uncertain, such as compliance with taking medication to control hypertension, may depend more strongly on outcome expectancies.

The studies described above demonstrate an important role for outcome expectancies in predicting behaviour and particularly the early stages of behaviour change. Furthermore, it has been suggested that outcome expectancies will have particular importance in the situation where desired behaviours are relatively easy to implement, but where perceived outcomes are uncertain. These characteristics therefore suggest an important role in predicting and influencing behaviour change in relation to climate change mitigation. However, the collective nature of climate change mitigation means that as for efficacy, a collective form of outcome expectancy is required. In the sections below, we review the more limited literature on group efficacy and group outcome expectancy.

Collective efficacy

Climate change, like many large-scale problems, induces a situation in which individuals have only a small influence and goals can only be achieved through collective action. As a result, the individual beliefs measured by self-efficacy and outcome expectancy judgements described above are unlikely to be sufficient for predicting behaviour change. Bandura (1982) therefore introduced the notion of group efficacy as a group level extension to SCT. He defined it as ‘a group’s shared belief in its conjoint capabilities to organise and execute the courses of action required to produce given levels of attainments’ (Bandura, 1997, p.447). As with self-efficacy, group efficacy beliefs are expected to influence the

behaviours people carry out through collective effort, the effort applied, how well resources are used and persistence when collective efforts face obstacles (Bandura, 2006).

There is a growing body of research demonstrating the impact of group efficacy on group functioning, including group performance (Bandura, 1997; Bandura, 2000; Collins and Parker, 2010; Jung and Sosik, 2003; Feltz and Lirgg, 1998, Little and Madigan, 1997; Gully et al., 2002). Stajkovic et al., (2009) carried out a meta-analysis of laboratory and field studies and found group efficacy to be significantly related to group performance. Bandura (2006) argued that, taken together, the findings demonstrate that ‘the higher the perceived collective efficacy, the higher the group’s motivational investment in their undertakings, the stronger their staying power in the face of impediments and setbacks, and the greater their performance accomplishments’ (p.318).

Given the collective nature of climate change mitigation efforts, collective efficacy is likely to be important in understanding behaviour, and we thus develop this idea in more detail below. In this discussion, we make a key distinction between teams and collectives, and thus where appropriate, between *team efficacy* and *collective efficacy*, and use the term *group* to refer to both teams and collectives. Although all these terms are used in the literature, they are poorly delineated and are often used interchangeably; however, we believe that this distinction is important. Specifically, our distinction centres around what we believe are two key differences between teams and collectives: firstly, the level of interdependence among individuals, and secondly the extent to which goals are shared.

According to Deutsch (1949 cited by Katz-Navon and Erez, 2005), the idea of interdependence between individual behaviours could relate to either the interdependence

of *tasks* themselves or to the interdependence of *outcomes*. Tasks are interdependent when one person's actions directly affect the performance of another, perhaps because their task needs to be completed before another task can be undertaken. Outcomes are interdependent when the successful accomplishment of a goal relies on the combined achievement of individuals, even if each individual can complete the task successfully, independently of the actions of others. In general, teams are likely to be characterised by interdependent tasks, whereas within collectives, tasks may be independent, even while outcomes are interdependent. A similar distinction is used by Katz-Navon and Erez (2005).

In relation to the second characteristic, while goals are likely to be shared within a team, this may not be true of collectives. In the extreme case of social dilemmas, some individuals may hold a collective goal leading to action in a particular direction (e.g. reduction in energy use) whereas others may hold goals that lead to directly opposed action (increase in energy use).

These distinctions mean that findings that relate to efficacy in team and collective situations may differ. Alavi and McCormick (2008) summarise the findings of a range of studies (e.g. Gibson, 1999) testing the first distinction between levels of interdependence, and conclude that when group members work independently (i.e. task interdependence is low), group efficacy was not related to group effectiveness. However, when groups work interdependently (i.e. high task interdependence), group efficacy was related to group effectiveness (Gibson, 2001 as cited by Alavi and McCormack, 2008). However, the extent to which these findings can be generalised to climate change mitigation is limited by the fact that in these studies, it is unclear to what extent participants shared the goal of high

performance, the fact that participation was compulsory and not optional, and the small group size. To our knowledge, the second variable distinguishing teams from collectives – that of the extent to which goals are shared – has not been experimentally manipulated. However, in studies relating to environmental problems that may involve a social dilemma aspect, findings relating to collective efficacy are mixed. Bonniface and Henley (2008) found that collective efficacy was low among both environmental activists and non-activists (and therefore did not predict pro-environmental behaviour), whereas Truelove (under review) found relatively high collective efficacy, but this again was not linked to intentions to engage with pro-environmental behaviours.

The evidence appears to point to the importance of considering group efficacy for understanding *group* performance when task interdependence is high and goals are shared. However, in relation to problems such as climate change where mitigation behaviours are optional and goals are not necessarily shared, the role of group efficacy in predicting *individual* participation is currently unclear and findings in the literature are mixed. The situation is further complicated by the range of ways in which group efficacy can be measured and the effect that different measurements may have on the relationship between group efficacy and behavioural outcomes, either at individual or at group level.

Group efficacy may be measured in three ways. Firstly, collective efficacy may be measured via a process that Bandura (2000) calls the aggregation of personal efficacies. For this measure, an index of group efficacy is determined by calculating the arithmetic mean of standard individual self-efficacy ratings. Secondly, group efficacy can be based on questions that explicitly refer to the group in the form ‘How certain you are that your group

can ... (task)' (Bandura, 2006). An index, called the Aggregated Holistic Index (Bandura, 2000), can be calculated by taking the mean of individual ratings of likely group performance; alternatively, as in the case of Riggs and Knight (1994), the individual judgements of expected group performance can be used directly. Finally, an approach called the *consensus* or *discussion* approach (Bandura, 2000; Katz-Navon and Erez, 2005) uses a single judgement per group that is arrived at through group discussion and negotiation.¹

Bandura (2000) argues that decisions about which method is appropriate depend at least to some extent on the level of interdependence of tasks. Specifically, when systems have low interdependence he advocates the use of the first approach (aggregated personal efficacies), but when systems are highly dependent he advocates the use of the holistic aggregated index. Although Gist (1987) has argued for the use of the consensus method, Bandura (2000) and Katz-Navon and Erez (2005) argue that it suffers from serious limitations, such as the problem of influential group members who command power and may ultimately pressurise individuals into conformity.

In summary, the literature on collective efficacy remains difficult to interpret, partially due to the effect of structural properties of groups and the tasks in which they are engaged, and

¹ Guzzo et al. (1993) refer to a related concept entitled group potency, which concerns individual assessment of group perceptions of the group's capability. Jung and Sosik (2003) carried out a study measuring group potency which was measured using eight items developed by Guzzo, et al., (1993) using statements such as 'No task is too tough for our group'. However, group potency is a general evaluation of the groups' capability (Collins and Parker 2010), whereas group efficacy beliefs, similarly to self-efficacy, are much more specific and focus on a specific task (Bandura 1997; Collins and Parker 2010).

partially due to the different methods of measuring the construct. The work on collective outcome expectancies presents a clearer picture, as now described below.

Collective outcome expectancy

Given the importance of distinguishing between efficacy and outcome expectancy at the individual level, several researchers have tried to make the same distinction at the collective level (Carrico and Riemer, 2011). Collective outcome expectancy refers to the beliefs individuals hold about ‘the likely consequences their group will experience as a result of the group’s performance of work tasks’ (Riggs and Knight, 1994, p.756). Collective outcome expectancy can be measured in a similar way to individual outcome expectancy, with statements focusing on the effects of behaviour carried out at the collective level, and should therefore refer explicitly to the group or collective. For example, Truelove (under review) uses wording of the form ‘if the majority of Americans adopted each behaviour, how effective would each action be in reducing global warming’.

Empirical evidence demonstrates that group outcome expectancies reliably predict behavioural outcomes in group situations. Specifically in relation to collective pro-environmental behaviours, among other variables, Carrico and Riemer (2011) examined the role of collective outcome expectancy in energy conservation in the workplace. Collective outcome expectancy was measured by asking participants about the extent to which they agreed with the statement: ‘By changing our behaviour, employees and students like me can reduce [the University’s] energy use’. Responses were made on a five-point scale ranging from ‘disagree strongly’ to ‘agree strongly’ (Carrico and Riemer, 2011). The authors found that higher levels of collective outcome expectancy during baseline

assessment were related to higher self-reported energy conservation behaviour at follow-up (Carrico and Riemer, 2011). Furthermore, Truelove (under review) found collective outcome expectancy to be associated with greater perceived moral obligation to take actions to reduce greenhouse gas emissions and, ultimately, intentions to perform these. This work provides evidence that collective outcome expectancy is associated with behavioural outcomes and intentions in potential social dilemma situations, specifically in the context of pro-environmental behaviour.

Theoretical difficulties of efficacy constructs for collective situations

As reviewed in earlier sections, research on self-efficacy and personal outcome expectancies makes clear distinctions between these constructs and offers relatively clear guidance on how to construct standardised self-report questionnaires to assess them. Furthermore, it provides a fairly coherent set of evidence demonstrating the link between the two constructs and behaviour, including behaviour change, and there is a growing body of evidence that shows that interventions that address these two constructs can lead to behaviour change in a range of situations, at least at the individual level.

The literature in relation to efficacy in group situations is currently less developed. Group efficacy is addressed in a relatively large number of studies and there is a growing body of evidence that demonstrates a positive relationship between higher group efficacy and desired behavioural outcomes when task interdependence is high, but findings are less clear for social dilemma situations. Group efficacy is operationalised in a range of ways, via at

least three methods of assessment (aggregation of personal efficacies, holistic aggregated index, consensus), making a synthesis of findings difficult (Jung and Sosik, 2003).

Only very few authors have discussed the notion of group outcome expectancies (sometimes referred to as collective response efficacy) (Collins and Parker, 2010; Riggs and Knight, 1994), or used it to examine environmental behaviours (Truelove, under review; Bonniface and Henley, 2008; Lam, 2006; Lubell, 2002). Empirical work in this area is limited to a small number of studies, many of which employ non-standard methodologies for the research area. Finally, none of the authors who discuss group outcome expectancies make the distinction between level of interrelatedness of tasks or behaviours.

We hypothesise that all four constructs – personal efficacy, personal outcome expectancies, group efficacy and group outcome expectancies – have the potential to influence behaviours in the context of climate change mitigation. Furthermore, we expect that the distinctions between situations with high and low interrelatedness are particularly important for social dilemma situations. In the remainder of this paper we present an attempt to unify the constructs and operationalise them in a manner that is consistent with the needs of those attempting to understand and influence behaviours in the context of large-scale, collective social dilemma situations such as climate change mitigation. We present theoretical arguments for our choice of particular efficacy constructs and their operational forms. We then identify research questions that are raised by the framework, the answers to which should help those involved in developing solutions to manage risks, such as those involved in developing policy and communication materials to encourage climate change mitigation.

Forms of efficacy and outcome expectancy within large-scale, collective problems

The aim of this paper is to identify the appropriate efficacy and outcome expectancy constructs for large-scale collective problems and to use these to develop a research approach that supports the investigation of policy-relevant questions for risk mitigation in the context of climate change and sustainable development. We begin by describing this framework, moving on to highlight a number of theoretical and applied questions raised by it that will form a productive focus for future research.

Concerns and orientations as predictions of goal attractiveness

Decisions about whether to engage in climate change mitigation actions are often provided to illustrate the concept of social dilemma situations. According to Dawes (1980), social dilemmas are defined by two simple properties: firstly, each individual benefits more by pursuing a personal (socially ‘defecting’) choice rather than a collective (socially ‘cooperative’) choice, regardless of what others in the society do; and secondly, all individuals will be better off if they all choose to cooperate rather than to defect (Dawes, 1980). According to the standard presentation of the situation, actions that could be taken to mitigate climate change are costly to individuals, while significant benefits are only reaped if sufficiently large numbers of individuals choose to reduce their emissions. Although in general this is true, the social dilemma aspects of climate change mitigation apply differently to different mitigation actions, and to different perceptions of costs and benefits.

Decision-making about whether to engage in certain mitigation behaviours does indeed present individuals with a social dilemma situation. For example, the decision of whether to take flights for overseas holidays can be thought of as placing individuals in a social dilemma situation where the cost of not flying is either that of forfeiting the overseas holiday itself, or the time required by alternative modes of travel. However, for other decisions, the social dilemma aspect may be minimal. For example, when deciding between comparative appliances with different energy efficiencies, if choosing a more energy-efficient appliance is no more expensive to purchase, then in the long run the consumer actually benefits from reduced energy bills. Finally, for some behaviours, individuals may weigh the costs and benefits differently, and thus for some individuals the same situation may present a social dilemma, whilst for others, it does not. For example, some individuals may view installing insulation as financially costly, leading to a social dilemma situation, whereas others may value it as conferring them direct benefits – a warmer house in winter – and thus not find themselves in a social dilemma situation. In other words, the same mitigation behaviour might present itself as a social dilemma to some, but not to others. As a result, individuals who have an interest in mitigation may engage in an action for the purpose of mitigation in the context of a social dilemma, for personal reasons alone, or for both. Furthermore, individuals who have no interest in mitigation may nonetheless engage in mitigating actions, but for personal reasons only. In the situation where taking mitigating action benefits individuals, we would expect minimal link between the collective forms of efficacy and outcome expectancies; however, we would expect collective efficacy and outcome expectancies to show a stronger relationship with pro-environmental behaviours in the case where goals or concerns are at the collective level, and decisions are taken in the

context of a social dilemma. In the following sections, we describe a process for establishing the role of individual and collective forms of efficacy and outcome expectancies, taking into account individual and collective goals.

Environmental concern

When considering motivations for performing pro-environmental behaviours, it is important to distinguish people's reasons for doing so. Stern, Dietz and Kalof (1993) distinguished between three environmental value orientations, comparable to Merchant's (1992) environmental ethics. Schultz (2000, 2001) refers to these as *environmental concerns* that affect behaviour: a) *egoistic*, according to which people base their decisions to act on the costs and benefits of the behaviour for them personally, b) *altruistic*, according to which people base their decision to act on the costs and benefits of the behaviour for others, and c) *biospheric*, according to which people base their decision to act on the costs and the benefits for the environment. As De Groot and Steg (2007) have pointed out, the validity of this distinction has been empirically verified in a range of studies (e.g. Schultz 2000, 2001), although Stern & Dietz (1994) find that altruistic and biospheric concerns cannot be distinguished in the general population.

This distinction provides one explanation for the fact that people may carry out the same behaviour, but for different reasons. For example, if the behaviour is to turn down the thermostat at home, individuals may perform this to save money (egoistic), they may do so because high energy use affects and endangers other people (altruistic), or they may do so because the emissions are harmful to the environment and other species living in it (biospheric). As De Groot and Steg (2007) point out, those with egoistic concerns do not

necessarily engage in fewer ecologically sound behaviours than those with altruistic and biospheric concerns, since the end result may be the same. Importantly though, egoistic concerns exist at a personal level, whereas altruistic and biospheric concerns are collective level constructs. Thus, in order to select the appropriate efficacy and outcome expectancy constructs, it is important to understand people's motivations and concerns, and whether these exist at the individual or collective level.

Goal attractiveness

As a first step to understanding efficacy and outcome expectancies in social dilemma situations, we therefore believe that it is important to distinguish between individual and collective reasons for engaging with particular actions. Specifically, while some may have individual goals such as saving energy or feeling warmer in winter, others may engage with the same behaviours for the explicit aim of mitigating climate change, while still others may have both goals. When only individual goals are involved, the relevant efficacy constructs reduce to those of standard self-efficacy and outcome expectancies at the individual level. In this situation, therefore, many of the findings established in the literature on individual efficacy are likely to apply. However, when the goals include explicit reference to climate change mitigation, collective efficacy constructs are required. When both individual and collective goals are present, individual goals are expected to align with collective goals (and may therefore be thought of as subgoals), and both sets of constructs may be needed. In other words, the efficacy constructs of relevance to individual decision-making about mitigation behaviours depend on goals and whether these exist at the individual or collective level.

The above discussion suggests that an initial analysis of goals is important to understanding which efficacy constructs are most likely to be associated with behaviour. Carrico and Riemer (2011) provide a way to measure what they term ‘goal attractiveness’ to determine the relative salience for participants of individual or collective goals.² Their approach uses a five point scale, and three items to measure the degree to which participants value the goal of reducing energy use, both at the personal level: ‘I would like to reduce the amount of energy that I personally use’, and at the collective level: ‘[The university] should do more to save energy’ (Carrico and Riemer, 2011). However, whilst Carrico and Riemer (2011) simply used these questions to measure the degree of interest in reducing energy consumption, we further suggest that a measure of this type should be used to establish which efficacy constructs are likely to be of relevance, adapting subsequent questions accordingly. We suspect that answers to this question would vary depending on the particular action under consideration, but that there would be a general tendency for each individual to be attracted to individual or collective goals according to their environmental concerns (egoistic, altruistic or biospheric). However, this suggestion awaits empirical validation.

Construction of precise measures of constructs

² This approach is similar to Ajzen and Fishbein’s (1980) measurement of ‘valence’ or the desirability of particular outcomes, but applied to the individual versus collective nature of outcomes.

Once the level attractiveness of individual and collective goals has been established, the focus then shifts to the the efficacy constructs of importance and their assessment. One of the difficulties of much of the work on SCT in the context of pro-environmental behaviours is a lack of clarity about the particular actions or behaviours. For example, one might expect participants to provide different levels of agreement with the following two statements: 'I can turn my thermostat down' and 'I can turn my thermostat down by 1°C'. Therefore, in order to be able to make predictions about behaviour that can be used to inform policy – where precise targets are required – goal attractiveness and efficacy statements need to be expressed to a sufficient level of specificity. We therefore suggest that all behaviours be specified as quantitatively as possible, in statements used to assess goal attractiveness, efficacy and outcome expectancies. Furthermore, Luszczynska and Schwarzer (2005) suggest that efficacy statements include a reference to barriers, with statements taking the form: 'I am confident that I can ... (perform an action), even if ... (a barrier)'. We believe that this approach is valuable, but would require a focus on identifying the barriers to particular pro-environmental behaviours. As Bandura (1997) pointed out, these barriers can be identified through preliminary work, where the challenges are identified and are then 'imported' into the efficacy items. This results in a scale allowing people to judge their capabilities in carrying out the behaviours even when faced with barriers.

In relation to the constructs of interest, in the case of individual goals, the self-efficacy (SE) and outcome expectancy (OE) constructs are the same as those used within individual situations: self-efficacy refers to judgements of how well one can execute courses of action, while the outcome expectancy refers to estimations of which behaviours will lead to the

desired outcomes. For example, if the personal goal is to save money (and specifically £50 per year) by turning the heating down by 1°C, the efficacy statement should begin ‘I am confident that I can turn my thermostat down by 1°C’, followed by particular barriers. The outcome expectancy statement then becomes ‘If I turn my heating down by 1°C, then I can save £50 per year’.

In the case of collective goals, the situation is more complex. Behaviours can be expected to depend on efficacy judgements at both the individual and collective level, as well as judgements of outcome expectancies at both scales. In other words, there are four constructs of interest: self-efficacy (SE), personal outcome expectancy (POE), collective efficacy (CE), collective outcome expectancy (COE). We now explain what is meant by each of these, and how they can be operationalised. The discussion is summarised below in figure 1.

<Figure 1 >

Self-efficacy (SE) and Personal Outcome Expectancy (POE)

In the case of collective goals, self-efficacy is defined and assessed in exactly the same way as for individual goals. However, unlike the OE construct employed in individual situations, within collective problems, we propose the use of personal outcome expectancy (POE). POE is defined as a measure of individual judgements about the likely consequences the collective will experience as a result of the individual performance. Since the outcomes of individual behaviours contribute towards the collective goal, this means

that POE relates to perceptions of how much the individual action contributes towards the collective goal. Therefore, we follow Lubell (2002) and define POE as a judgment of the extent to which individuals' actions can contribute to the collective goal. Lubell (2002) examined POE by asking participants to respond to the following statement: 'It is just too difficult for someone like me to do much for the environment' with answers ranging from 1 for strongly agree to 5 for strongly disagree. Lubell (2002) found that this component had a significant and positive effect on behaviour as 'people who believe the environment is unhealthy and that they can do something about it are more likely to express intentions to engage in environmental activism and to actually act on those intentions' (Lubell, 2002, p.441). Furthermore, Heath and Gifford (2006) examined the role of POE (which they refer to as self-efficacy) in environmental behavioural intentions. They found POE to explain the most variance in behavioural intentions and went on to argue that 'it appears that before individuals are ready to act against climate change, they must believe that even a small thing one individual can do will make a meaningful difference' (p.64).

POE is also an important component within social dilemma situations. Steg (2003) argued that cooperation decreases within large-scale problems involving many people partly due to reduced beliefs in the degree to which an individual's contribution makes a difference (Steg (2003) refers to this idea as self-efficacy). Discussing low participation rates within social dilemmas, Kerr (1996) pointed out that POE functions as a barrier to action: 'When confronted with the genuine threats posed by many such large-scale and seemingly intractable social dilemmas, which of us has not responded to appeals for contributions of effort, time, or money with the not-entirely self-serving question, "Does my contribution really matter?"' (p.210). In other words, the definition of POE provided above is the right

construct for large-scale collective problems as the question of whether a person believes individual actions can have an impact on the problem is likely to contribute to his or her decision making.

We therefore suggest that POE should be operationalised via statements that measure perceptions of the extent to which the outcomes of individual behaviours contribute to achieving collective goals using the statement: ‘If ... (an individual behaviour), then ... (contribution to collective goal)’ modified from Luszczynska and Schwarzer (2005, p.148).

Collective Efficacy (CE)

Several different group efficacy constructs and operational measures are provided in the literature. Among the different measures of group efficacy, the discussion or consensus method is inappropriate for large-scale problems due to the practical difficulties of communication among individuals in collective situations. The aggregated individual efficacy method of assessing collective efficacy is also inappropriate as it is based on judgements of individual competency to carry out a behaviour, and does not measure the capabilities of the whole group to carry out actions at the collective level (Alavi and McCormick, 2008). Thus, in the context of a collective problem, the most pertinent measure is that of the aggregated holistic index (Bandura, 2000), calculated as the mean of individual ratings of the capacity of the collective to carry out the behaviour. If the aim is to predict *individual* behaviour, we suggest using individual ratings of CE, whereas if the aim is to predict *collective* response, the aggregated holistic index should be used. Thus, in our framework, collective efficacy is defined as a measure of individual judgements of the ability of the collective to conduct a particular behaviour.

We note that although Bandura (2006) argues that individual efficacy judgements can be aggregated to give a measure of collective efficacy when there is low task or behavioural interdependence, we argue that this measure is inappropriate in social dilemma situations. Although individual actions can be independent of one another in social dilemma situations (e.g. I can install insulation even if you do not), the decision to cooperate may depend on the decisions of others, especially when the benefit is only attained if a threshold of cooperation is achieved. Therefore, while individual cooperative behaviours can be carried out largely independently of cooperative behaviours of others, the *decision* to cooperate is not independent of the decision of others to cooperate. Therefore, interdependence is shown at the level of decision to cooperate rather than the behaviours themselves.

Using the aggregated holistic index as a basis for measuring collective efficacy, one might suggest using the format proposed by Bandura (2006, p.334): ‘For each situation please rate how certain you are that ... (the collective), working together as a whole, can ... (behaviour)’. However, the social dilemma nature of the problem means that responses to this statement fail to capture beliefs about trust in others to carry out the behaviour.

Dawes (1980) pointed to two possible effects of individual decisions to cooperate in social dilemma situations: a) the ‘free-rider’ effect, and b) the ‘avoid being a sucker effect’. The *free-rider effect* exists when individuals believe others will cooperate (i.e. high levels of trust in others’ cooperation) and they believe they can defect without significantly hurting others. Truelove (under review) used this idea to explain her finding of a negative relationship between CE and pro-environmental behavioural intentions. The *avoid being a sucker effect* exists when individuals believe others will not cooperate (i.e. low levels of

trust in others' cooperation) such that they believe they should also defect so as to avoid incurring costs with limited or no gain. It is currently unclear how this effect relates to pro-environmental behaviours since Bonniface and Henley (2008) examined CE perceptions of environmental activists and non-activists and found that *both* groups had low collective efficacy.

As a result of considerations of this type, Lubell (2002) argues that CE (which he refers to as citizen efficacy) is concerned with trust in other people to carry out the behaviours required for influencing collective outcomes. He goes on to point out that people cooperate 'if they trust others to cooperate' (Lubell, 2002, p.436). Indeed, extensive research in social dilemmas has found trust to be a key construct in cooperative behaviours (Dawes, 1980, De Cremer et al., 2001, Van Vugt, 2009).

We therefore suggest that it may be more meaningful to operationalise CE via statements that refer to levels of confidence that other individuals can and will carry out the behaviour. Although Bandura (2006) makes a point of insisting that efficacy statements should refer to ability as opposed to intention, the construct we are interested in falls somewhere between these ideas and is akin to the 'self-trust' that is embodied in much of the work on efficacy in the health literature. For example, when individuals are asked the extent to which they are *able* to refrain from smoking, this taps psychological willpower and issues of 'self-trust' as much as physical capability. We therefore suggest that establishing the appropriate wording to capture trust should form a focus of future work. We anticipate that using the future tense of the verb 'to be able', giving rise to statements of the form 'I am confident that (a collective) will be able to ... (perform an action), even if ... (a barrier)' would

capture this effect, whilst also tapping persistence in relation to the long-term nature of most mitigation behaviours, but this would need to be tested empirically.

Collective Outcome Expectancy (COE)

The question of whether individuals believe that collective actions can have a significant impact on the collective problem is likely to contribute to their decision-making in the context of large-scale problems. The collective outcome expectancy (COE) construct of the framework introduced here is defined as a measure of people's judgements of whether collective action can help achieve the collective goal. As has already been found by other researchers (Carrico and Riemer, 2011; Bonniface and Henley, 2008) collective outcome expectancy is linked to pro-environmental behaviour. Truelove (under review) has also found that collective outcome expectancy (referred to in her work as collective response efficacy) was associated with intentions to perform mitigation actions. Here, we propose that COE be operationalised via questions that relate to perceptions of how well the outcomes of collective actions will help to meet collective goals and that statements should be worded 'If ... (collective behaviour), then ... (achievement of collective goal)'. It is not currently clear how the 'collective behaviour' aspect of the above statement should be worded. For example, it would be important to test whether statements that refer to *most* individuals engaging in the behaviour elicit different responses from versions that refer to *all* individuals, or to the broader idea of *everyone*. We expect that a version that refers to *most* individuals engaging in the behaviour is likely to provide the most meaningful responses since a small number of defectors are likely to have only a small impact on overall outcomes; however this would need empirical validation.

Figure 2 below provides an example of the framework applied to one of the climate change mitigation behaviours recommended by the Energy Saving Trust (Energy Saving Trust, 2011).

<Figure 2>

Future research

The framework described above, consisting of the particular efficacy constructs outlined, can help us to understand barriers to behaviour change, to formulate particular research questions and to form hypotheses in relation to these. We now identify specific research questions that should be addressed in order to use the framework above to generate responses to policy-relevant questions.

It is important to construct valid and reliable measures for efficacy and outcome expectancies at the collective level. This requires testing different formulations of goal attractiveness, efficacy and outcome expectancy statements. Firstly, it would be useful to evaluate the importance of level of specificity on response patterns. For example, it would be helpful to investigate whether different results are obtained for different levels of engagement with behaviours (e.g. by referring to turning the thermostat down by 1°C or 2°C), and whether it is therefore useful to ask about these goals separately. Secondly, it would be helpful to understand how we might be able to capture the element of trust in collective efficacy judgements, and specifically whether the ‘I am confident that (a collective) will be able to ...’ wording taps this construct. Finally, it is important to

understand how best to formulate statements relating to collective behaviour, and whether it is most helpful to refer to 'most people', 'everyone', etc.

A further issue that requires empirical work before complete efficacy statements can be constructed is that of assessing the barriers to behaviour change, since these are integrated into the second clause of efficacy statements. On the basis of a particular set of suggested behaviours, such as those proposed by the Energy Saving Trust (2011), barriers could be identified via mini-interviews or focus group discussions to gain responses from a broad range of respondents.

Once reliable and valid tools for assessment of both individual and collective forms of efficacy and outcome expectancies have been constructed for climate change mitigation behaviours, particular research questions can then be addressed. Firstly, there are questions relating to the level of heterogeneity among individuals and their responses to behaviours. Secondly, it would be useful to understand how the different forms of efficacy relate to behavioural outcomes. Finally, we would hope to explore questions relating to the effectiveness of interventions designed to change behaviours by attempting to influence on efficacy constructs.

It would be useful for risk managers to understand the extent to which individuals differ in their efficacy and outcome expectancy perceptions and their behavioural response to different behaviours, as answers to these questions will determine the level of personalisation of policies aimed at encouraging individuals to engage with new behaviours. For example, it would be useful to know whether the environmental concern characteristics (egoist, altruist or biospheric) can be used to predict goal attractiveness, and

whether this in turn predicts the particular forms of efficacy that are high or low. Alternatively, it may be that individuals differ more in their responses to particular behaviours (travel versus heating related behaviours) than among environmental concern types.

In attempting to design behavioural interventions, it would be useful to know which forms of efficacy are most strongly related to behaviour change and how these depend on individual versus collective goal types. This information will allow those designing interventions to focus on influencing those forms that are most likely have a positive impact on behaviour. For example, it may be that the confluence of high efficacy and outcome expectancies are required in order for individuals to engage with mitigating behaviours. However, work with individual problems (e.g. health) suggests that efficacy may have more influence when outcome expectancies are high, and the relationship between the different forms may be complex. Indeed, in evaluating this relationship, it is likely to be necessary to understand the bottlenecks that cause inaction, rather than simply investigating correlations between factors. Furthermore, there may be a temporal aspect to the relationship between efficacy and behaviour, as is the case with individual forms whereby outcome expectancies come into play primarily at early stages. It would be helpful to know whether the same applies to collective forms.

Finally, the introduction of new forms of efficacy raises new questions relating to forms of interventions. In particular, it would be useful to establish to what extent it is possible to use communication-based interventions or other policy strategies to influence people's perceptions of goal attractiveness, especially if it emerges that those who hold both

individual and collective goals are more likely to engage in pro-environmental behaviours. It would also be useful to know whether interventions that aim to influence goals are more or less effective than those that aim to increase the different forms of efficacy beliefs and outcome expectancies. It would also be helpful to establish whether the same pattern of effectiveness of intervention types (enactive mastery and vicarious experience), applies to collective efficacy as well as to individual forms. This is particularly true given that current climate change communication relies on verbal persuasion as the main source of communication, which has been shown to be relatively ineffective in work in individual situations.

Conclusion

This paper proposes an integrated framework based on the distinction between individual and collective goals that encompasses individual and collective levels of efficacy and outcome expectancy. This is intended to be applicable primarily in large-scale collective problems, and especially those with a social dilemma aspect. Many studies to date have used each of these constructs separately, with results demonstrating their effect on individual and group functioning. Only one study to date has used all four collective constructs (Truelove, under review), but did not distinguish between individual and collective goals. A better understanding of the constructs should help in encouraging sustainable behaviours and in practical applications, the framework should allow policy-makers to determine which forms of efficacy and outcome expectancies are low. It seems likely that to be effective, climate change communications should instil in people the belief that they have the capability to change their behaviours (SE). Moreover, they might also be

used to encourage people that these behaviours will contribute meaningfully to achieving the collective goal (POE), that others are also capable of changing their behaviours (CE) and that our collective actions will help achieve the collective goal (COE). We have identified particular questions for future research that will allow us to understand whether, and to what extent, this suggestion is correct, and thus to allow risk managers and those involved in designing interventions to do so in the most productive way.

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Individual Goal	Collective Goal
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	Individual		Individual	Collective
Behaviour	Individual Efficacy (SE) <i>'Can I do it?'</i>	Behaviour	Self-Efficacy (SE) <i>'Can I do it?'</i>	Collective Efficacy (CE) <i>'Will we be able to do it?'</i>
Outcome expectancy	Outcome Expectancy (OE) <i>'Will my behaviour contribute to me achieving my personal goal?'</i>	Outcome expectancy	Personal Outcome Expectations (POE) <i>'Will my behaviour contribute meaningfully to achieving the collective goal?'</i>	Collective Outcome Expectations (COE) <i>'Will our behaviour contribute meaningfully to achieving the collective goal?'</i>

Figure 1 The matrix of forms of efficacy and outcome expectations for social dilemmas and/or large-scale collective problems. The questions in italics are provided for illustrative purposes.

Individual goal / Egoistic concern (e.g. save money)		Collective goal / Biospheric or altruistic concern (e.g. help reduce end-user energy use and carbon emissions)		
	Individual		Individual	Collective
Behaviour	Individual Efficacy (SE) <i>'Can I turn down my thermostat by 1°C?'</i>	Behaviour	Self-Efficacy (SE) <i>'Can I turn down my thermostat by 1°C?'</i>	Collective Efficacy (CE) <i>'Will we all be able to turn down our thermostats by 1°C?'</i>
Outcome expectancy	Outcome Expectancy (OE) <i>'Will turning down my thermostat contribute to me saving money (£50 per year)?'</i>	Outcome expectancy	Personal Outcome Expectations (POE) <i>'Will turning down my thermostat contribute meaningfully to reducing carbon emissions?'</i>	Collective Outcome Expectations (COE) <i>'Will turning down our thermostats contribute meaningfully to reducing carbon emissions?'</i>

Figure 2 The matrix of forms of efficacy and outcome expectations. Each may be high or low in social dilemmas and/or large-scale collective problems (illustration for the particular behaviour of turning down the thermostat down by 1°C).

WHICH EFFICACY CONSTRUCTS FOR LARGE-SCALE SOCIAL DILEMMA PROBLEMS? INDIVIDUAL AND COLLECTIVE FORMS OF EFFICACY AND OUTCOME EXPECTANCIES IN THE CONTEXT OF CLIMATE CHANGE MITIGATION.

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Abstract

Effective management of climate change risk requires an understanding of how to encourage positive behaviour change at the collective level. The urgency of the problem and the social dilemma nature of decisions about whether to engage in pro-environmental behaviours raise particular challenges for policy makers and those involved in designing interventions. Evidence reveals that efficacy beliefs (judgements of the ease of carrying out a particular act) and outcome expectancy beliefs (judgements of the value of acts in reaching goals) function as important determinants of human motivation and action (Bandura, 1995). However, efficacy and associated constructs remain poorly theorised at the collective level, particularly in social dilemma situations where goals may exist at both individual and collective levels. We develop a framework that incorporates collective forms of efficacy and outcome expectancy for large-scale, social dilemma situations, and operationalise these constructs. We then discuss how this framework can support us in managing climate change risk by allowing us to identify the specific forms of efficacy and outcome expectancy that should be targeted in research, science communication and policy.

Keywords

Climate change; self-efficacy; collective efficacy; outcome expectancy; collective outcome expectancy; social dilemma.