



The Impact-Likelihood Matrix: A policy tool for behaviour prioritisation



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ABSTRACT

The proliferation of applied behaviour change science over the past decade has provided new ways of thinking about policy making. Policy makers now have a range of frameworks and methods to assist in formulating change for social and environmental benefits. However, the development of strategies for the identification and prioritisation of target behaviours has been less forthcoming. This paper outlines a tool to assist in behaviour selection. Behaviours are assessed for their potential impact on addressing a specific issue, the likelihood of adoption by the target audience and existing participation levels within the target audience. Each of these characteristics is scored, allowing behaviours to be mapped onto a meaningful, visual, matrix for prioritisation. Additional data on behaviour type and the key perceived barriers to participation in each behaviour are layered onto the matrix to provide direction for intervention design. An application of the prioritisation matrix is presented within an environmental context through a case study of water demand management behaviours for domestic consumers in Australia. The prioritisation matrix could provide a decision-making tool for policy makers to assist in the selection of target behaviours to address complex issues.

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1. Introduction

Identifying and implementing solutions to complex environmental issues such as climate change, deforestation and natural resource management continues to challenge researchers and policy makers (Head, 2014). Human behaviour is a fundamental part of these environmental issues and therefore changing behaviour is a critical part of the solution (Corner and Owen, 2014; Schultz, 2011; Jackson, 2005; Ölander and Thøgersen, 1995). This has prompted governments to apply behaviour change science to address some of these concerns (e.g., Dilley, 2015; Kazdin, 2009). For example, 'nudge' interventions, designed to facilitate single-action beneficial outcomes, have been successfully trialled to support policy translation to behaviour change within the environmental, health and social fields (Jones et al., 2014, 2011).

While nudges may be useful when an individual outcome is defined, more complex policy problems are likely to have multiple behavioural solutions. For example within the environmental context, an array of actions, and target audiences, may contribute towards an environmental goal. The Global Action Plan Ecoteam

program to reduce household environmental impacts targeted 93 behaviours across transportation, waste, shopping, water and energy consumption (Staats et al., 2004; Staats and Harland, 1995). Studies investigating household energy saving actions in the USA and Australia have identified between 100 and 261 behaviours for household energy consumption reduction (Woods, 2008; Hargroves et al., 2010; Boudet et al., 2016). A household water demand management program identified 64 behaviours just considering outdoor water use (Manning et al., 2013). Identifying clearly defined behaviours to achieve specific outcomes is vital for focused program design, ensuring successful intervention development and production of accurate program evaluation (McKenzie-Mohr and Smith, 1999; McKenzie-Mohr et al., 2011; Stern, 2011). For the environmental policy-maker with limited resources wanting to trial an intervention campaign, selecting target behaviours out of the myriad of options is a challenge. Tools to help decision-makers focus their behaviour change programs are therefore essential for goals to be met with the resources available.

1.1. Identifying and prioritising target behaviours

The behaviour change literature describes many methods to investigate audiences and develop effective intervention programs

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for behaviour adoption. For example, in the area of water conservation, audiences have been characterised by identity (Fielding and Hornsey, 2016), beliefs (Russell and Fielding, 2010), context (Gilbertson et al., 2011), habits (Russell and Fielding, 2010) and existing behaviours (Dean et al., 2016). The intervention methods used to modify water use behaviours have also undergone investigation, with evaluation of communication methods (e.g. Seyranian et al., 2015; Fielding et al., 2013; Syme et al., 2000), incentives (Gato-Trinidad and Gan, 2012), pricing structures (Olmstead and Stavins, 2009), and regulation (Oh and Svendsen, 2015). In contrast, it has been noted that there is a relative dearth of work on the behaviour identification and prioritisation elements of the behaviour change process (Inskeep and Attari, 2014; Department of Environment and Food Rural Affairs, 2008), with few methods trialled. The current research seeks to address this limitation by developing and testing a visual technique for prioritising target behaviours to change.

For some policy issues, such as getting cyclists to wear helmets (Quine et al., 2001), or encouraging citizens to pay taxes on time (Hallsworth et al., 2014), the behavioural outcome is evident. In the environmental field however, program goals, such as aiming to reduce carbon dioxide emissions, are complex (Ludwig, 2001) and identification of behaviours addressing such issues may require input from multiple stakeholders, including industry professionals, academics and target audience members (e.g. Hargroves et al., 2010; Boudet et al., 2016; Manning et al., 2013). As a result, behavioural solutions to issues of resource management may number in their hundreds (Boudet et al., 2016; Woods, 2008), resulting in the publication of lengthy 'How-to' guides for personal environmental-impact reduction practices (such as Yarrow, 2008; Goodall, 2007; Berners-Lee, 2011). The identification and promotion of long lists of target behaviours for audience adoption has been criticised for being confusing, overwhelming target audiences, reinforcing existing misconceptions and reducing participation (Gardner and Stern, 2008; Karlin et al., 2014). Prioritisation of potential actions addresses such issues, and facilitates the development of focussed interventions (Gardner and Stern, 2002).

Various approaches to prioritisation have been proposed, including prioritising on the basis of how much resource can be saved through adopting a behaviour (i.e. amount of impact on the issue), the likelihood of behavioural adoption by the target audience, the level of current participation in a behaviour, and a combination of the three. In terms of using behavioural impact as a method for prioritisation, Gardner and Stern (2008) identified 17 actions that were estimated to save 58.2% of US household energy use and Inskeep and Attari (2014) identified 14 behaviours that could save up to 75.3% of indoor water use. The authors recommended that the 'shortlists' which emerged from their research be promoted to householders, although they also recognised that householders may face 'economic, psychological, sociocultural and informational' barriers in behaviour participation (Inskeep and Attari, 2014, p.12).

The recognition that a range of barriers may hinder behavioural adoption and affect the ease of behavioural uptake (Gardner and Stern, 2008) despite audience motivation (Stern, 2000) speaks to the issue of likelihood of adoption, a second important dimension which can be used to prioritise behaviours in behaviour change campaigns. Financial, (Clarke and Brown, 2006), physical (Black et al., 1985), cognitive or temporal costs of participation (Bandura, 1997; Smith et al., 2010; Diekmann and Preisendorfer, 2003; Attari et al., 2010) may make a behaviour harder to engage in and thereby decrease the likelihood of adoption.

In contrast, behaviours with lower perceived costs or effort of participation are more likely to be adopted (Osbaldiston and Schott, 2011). Researchers have used perceptions of effort as a proxy for likelihood of behaviour adoption. Specifically,

householder perceptions of physical effort, cognitive effort, temporal and financial costs were used to assess the likelihood of participation in energy-saving behaviours (Attari et al., 2011). However, prioritisation of behaviours based solely on the likelihood of adoption risks promotion of 'simple and painless' behaviours (Thøgersen and Crompton, 2009). These behaviours may be low effort and relatively easy for audiences to perform, but have little impact on the issue at hand. This is of particular concern when considering the immediate, large-scale changes required to address many environmental issues (Thøgersen and Crompton, 2009; MacKay, 2008) and highlights the need to consider both impact on the issue and likelihood of adoption (Ölander and Thøgersen, 1995; Kollmuss and Agyemang, 2002) when considering behaviour prioritisation (Steg and Abrahamse, 2010).

One approach to prioritisation that incorporates the two concepts of impact on the issue and likelihood of adoption is the 'Community Based Social Marketing' (CBSM) methodology. This combines behaviour identification with cost-benefit analysis to create and refine long-lists of behaviours, scoring them on their impact on the issue and probability of adoption by the target audience (McKenzie-Mohr and Smith, 1999; McKenzie-Mohr et al., 2011). Each behaviour identified is also scored on the existing level of engagement within the target community. If the target audience already engages with the desired behaviour, the potential for additional uptake is limited to the few people not already practising the behaviour. Behaviours with lower current participation therefore have greater potential, or opportunity, for adoption (McKenzie-Mohr et al., 2011). The CBSM method suggests combining the three scores for impact, likelihood of adoption and existing penetration to form a single numeric measure which can be used to rank and prioritise behaviours within a list (McKenzie-Mohr and Smith, 1999; McKenzie-Mohr et al., 2011).

1.2. Visualisation for behaviour prioritisation

Existing approaches, such as *Community Based Social Marketing*, provide a useful way to prioritise behaviours by reducing the assessment of impact, likelihood of adoption and existing penetration to a single number. However, this risks losing detail within the data which may be valuable to the behaviour prioritisation process. We therefore propose a novel method for prioritisation which uses a visual matrix, to represent behaviours on their impact and an effort-based measure of likelihood of adoption, overlaid with data on current participation by the target audience. A matrix provides decision makers with an easy-to-read summary of potential target activities and allows an understanding of how they relate to each other (Lazard and Atkinson, 2014; Trumbo, 1999). This paper demonstrates that mapping behaviours on to a matrix, using their impact on the issue and likelihood of adoption, allows identification of priority behaviours by their location within the grid, whilst retaining other valuable information such as clustering of particular behaviours (see Fig. 1).

Behaviours with a low impact on the issue and low likelihood of adoption (lower-left quadrant of Fig. 1), are low priority, as they are hard to adopt and achieve little to address the issue at hand; they are 'hard and ineffective'. 'Easy but ineffective' behaviours (lower-right quadrant) have a high likelihood of adoption, but lack impact on the issue. However, the 'Foot-in-the-Door' effect suggests participation in an initial easy, small, behaviour can increase subsequent uptake of larger, more difficult behaviours (Freedman and Fraser, 1966). Therefore, low impact, easy behaviours could act as levers or catalysts which encourage adoption of additional, more impactful, behaviours in the future (Thøgersen and Ölander, 2003; Thøgersen and Noblet, 2012). Behaviours with a high likelihood of participation and large impact on the issue (top-right quadrant) are 'easy and effective'. Described as 'low-hanging fruit' (Attari et al.,

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