A Slap on the Wrist or a Pat on the Back: The Impact of Feedback on Pro-Environmentalism

by

Maciek Lipinski-Harten

A thesis submitted in conformity with the requirements for the degree of Doctorate of Philosophy

Department of Psychology
University of Toronto

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Abstract

A series of five studies examined how praise and reproach feedback influenced participants’ pro-environmental inclinations. Though past research has shown that praise feedback is a more effective and longer-lasting source of motivation than reproach feedback, popular pro-environmental communications campaigns nevertheless largely attempt to increase pro-environmentalism by reproaching the inadequacy of pro-environmental awareness and action among members of the public. This investigation set out to determine which approach is best: a slap on the wrist or a pat on the back. First, studies evaluated the effects of praise and reproach feedback that was conveyed in the general fashion that is typically adopted in public pro-environmental campaigns. Participants who experienced such general, omnibus feedback did not show greater pro-environmental inclinations after receiving either praise or reproach. Instead, this form of feedback resulted in a lower willingness to identify with pro-environmental issues whenever participants were reproached for their pro-environmental performance. When feedback was formatted to be more behavior-specific, the impact of feedback on pro-environmental
inclinations depended upon whether praise and reproach feedback was conveyed in gain-framed (i.e., focusing on savings) or loss-framed (i.e., focusing on waste) terms. When gain-framed terms were used, both participants who received praise and those who received reproach had greater pro-environmental behavioural intentions and support for environmental preservation efforts than those who received feedback framed in the loss-framed terms that are typically favored by popular communications. Overall, my findings indicate the need for pro-environmental advocates to adopt more behaviour-specific and gain-framed forms of feedback in order to have a meaningful positive impact upon individuals’ pro-environmental inclinations.
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A Slap on the Wrist or a Pat on the Back: The Impact of Feedback on Pro-Environmentalism

Less than half of a century ago, mainstream public concern over the health of the environment was minimal (Dunlap, 1991) and most individuals went about their day without considering the environmental consequences of their behaviours. At present, public awareness has changed and the environmental consequences of everyday behaviours are difficult to ignore. Films about environmental damages have become blockbusters (e.g., Conners, Conners & DiCaprio, 2007; Gore, 2006), books about impending ecological disasters have reached bestseller lists (e.g., Lynas, 2007; Rees, 2003) and summits on environmental policy capture the attention of worldwide news agencies (e.g., Guardian Professional, 2012). Meanwhile, public policies related to the environment affect many everyday decisions ranging from automobile purchases to the use of disposable items such as plastic bags and bottles (e.g., “Toronto council…”, 2008). In the midst of these challenges, it is increasingly necessary for individuals to understand the impact that their habits and behaviours have upon the environment.

Current approaches to pro-environmental messaging

The most obvious and readily available informational resource for a large and growing majority of North Americans is the internet (PEW, 2012), which features a variety of environmental self-assessment tools and questionnaires. Among the most popular and credible of these tools is the World Wildlife Fund’s EcoGuru interface (WWF, 2009). This tool presents users with an opportunity to “calculate your footprint” by answering a series of questions regarding everyday habits and behaviours ranging from food consumption to energy usage to transportation choices. After responding, individuals are provided with feedback that summarizes how many “planets” worth of resources their consumption behaviours depend upon (e.g., “You
are living as if we had 2.56 planets to support us but we only have one”). On closer examination, one finds that this tool is programmed to provide each of its users with reproachful feedback. Even an individual who eats only local food, does not drive, and uses public transport will be told that he or she is “living as if we had 1.6 planets.” A more typical Canadian individual who drives on occasion and purchases the odd bunch of Chilean grapes (Government of Canada, 2012) will receive a more dire message that he or she is “using the natural resources of 2.8 planets.” Adjacent to this “footprint calculator,” EcoGuru provides users an opportunity to research ways to “green your lifestyle” by registering their commitment to future changes in pro-environmental behaviours. For the World Wildlife Fund, the ability to affect individuals’ pro-environmental behaviours has clearly been exclusively staked upon the motivating effects of reproachful performance feedback.

A broader examination of pro-environmental public messaging campaigns easily finds the World Wildlife Fund’s approach to be the norm. Other personal online evaluations such as DailyGreen.com’s “How green are you” quiz (The Daily Green, 2007) and myfootprint.org’s Ecological Footprint Calculator (Center for Sustainable Economy, 2012) are similarly designed to exclusively provide negatively-valenced feedback in regard to users’ everyday resource and energy consumption. Aside from these personal evaluation tools, individuals who are searching for information from pro-environmental organizations are also sure to find numerous pieces of feedback that exclusively reproach consumption behaviours in either a direct or indirect fashion. For example, the websites and promotional materials of pro-environmental organizations such as Greenpeace often feature stories about the kinds of environmental hardships and disasters brought about by large companies that produce energy and numerous other products that most individuals consume on a daily basis (e.g., Greenpeace, 2012). Based in Canada, the David Suzuki Foundation promotes the mantra, “think globally, act locally,” often by raising awareness
of the ways that everyday activities and product usage result in irreversible damage to the natural environment (e.g., Lefurgey-Smith, McCall, Knauer & Rathje, 2012). This sort of feedback is similarly on display in popular, mass media. In particular, numerous recent documentary films have raised alarm over environmental harms resulting from activities ranging from general consumption (Fox, Leonard & Sachs, 2007) to food consumption (Pearlstein, 2008) to the widespread use of plastic bags (Miller & Bates, 2010). This is not to suggest that such feedback is either inaccurate or worthless as a source of information. Indeed, there is ample evidence indicating that the troubles facing the natural environment are very real and that substantial changes to everyday human consumption behaviours are needed to address these problems (Gerlagh & van der Zwaan, 2003; Nordhaus & Boyer, 2003; Wackernagel & Rees, 1996). What remains uncertain is whether reproachful feedback actually has the intended effect of persuading individuals to adopt more pro-environmental behaviours.

There is therefore no question with respect to the accuracy of the sorts of direct and indirect feedback one finds in the mass media examples outlined above. Rather, the questions posed by my research focus on the framing of this feedback. Each pro-environmental organization listed above, alongside countless others, has chosen to deliver accurate feedback within a reproachful frame. This decision is undoubtedly founded on the belief that such framing will make feedback effective at enhancing the pro-environmental behaviours, beliefs and attitudes of feedback recipients. In response to this, my research set out to determine whether this belief holds true, and whether a positive framing that emphasizes praise and pro-environmental gains could do better at influencing feedback recipients to become more pro-environmental.

The shortcomings of reproachful feedback

Research on message framing suggests that the type of reproachful, negatively-valenced feedback that is commonly used by pro-environmental agencies may not be particularly effective
as a means of changing the behaviours of individuals who receive such feedback. The specific effects of reproachful feedback regarding environment-related behaviours on individuals’ actual behaviours have not been directly tested. Nevertheless, investigations of messages with a similar purpose suggest that framing feedback in a way that emphasizes the real or potential negative outcomes of a person’s behaviours is a poor method of persuasion. In a now-classic study that examined the effects of messages concerning smoking, driving safety and venereal disease, Rogers and Mewborn (1976) found that messages designed to solely highlight undesirable, negative consequences were relatively unconvincing when these elements were disproportionately represented in comparison to the efficacy of the proposed solution (if, indeed, any solution was proposed). One conclusion arising from this finding is that such negative information may be ineffective at changing behaviours when a problem appears so large as to render an individual’s personal behaviour changes as an ineffective solution. This finding ought to be troubling to pro-environmental advocates who use feedback that reproaches both individual and large-scale behaviours that impact upon the environment by highlighting the broad environmental damages to which these behaviours contribute. When it comes to such feedback, the scale of the source of undesirable, negative consequences (i.e., massive environmental damage) may appear, to most individuals, as disproportionate to the scale of the proposed solution (i.e., reducing individual consumption behaviours). When pro-environmental behaviours are thus portrayed as being far-removed from the types of large-scale changes that are needed to address environmental problems, recipients of such feedback should take little interest in adopting pro-environmental behaviours.

Of course, some campaigns such as Earth Hour (WWF, 2012) and citywide litter reduction efforts (e.g., Livegreen Toronto, 2012) are designed to address such reactions by emphasizing that collective pro-environmental action can, indeed, allow individual responses to
match the scale of environmental problems faced by humankind. That is, individuals may be reproached for the state of the earth or their city, but they may also be reminded that individual changes can add up to make a real difference. This approach, however, may also fail to the extent that individuals rely upon others to engage in the behaviour change. That is, individuals may fall prey to a *tragedy of the commons* scenario (Wackernagel & Rees, 1996), whereby each individual will consider social loafing to be in his or her best interest while leaving the difficult work of adopting more pro-environmental habits and behaviours to others (Joireman, Posey, Truelove & Parks, 2009; Karau & Williams, 1993; Kollock, 1998). In sum, it seems unlikely that feedback reproaching individuals for their contribution to environmental problems will be effective. Feedback that reproaches individuals by highlighting massive environmental damage may be ineffective because individuals will see little hope of resolving such large-scale problems through personal efforts. Moreover, even when reproach feedback emphasizes the efficacy of personal efforts to change, it may fail due to individuals’ reluctance to rely on others to make similar efforts.

Reproachful feedback may not only fail at motivating individuals, but may also serve to undermine and even reduce individuals’ motivations to engage in future pro-environmental behaviours. According to self-determination theory, an individual will be intrinsically motivated to engage in an activity only insofar as that individual considers him- or herself competent in that activity (Deci & Ryan, 1987). An individual who accepts reproachful feedback regarding his or her pro-environmental behaviours might feel less pro-environmentally competent and therefore less intrinsically motivated to engage in future pro-environmental behaviours. Research has demonstrated this outcome in other domains of behaviour. In a study that had children engage in a competitive task, for example, Vallerand, Gauvin and Halliwell (1986) found that children who received implied reproach by being informed of the superior performances of their peers felt less
competent and less intrinsically motivated to engage in the task. Vallerand and Reid (1984, 1988) found the same outcomes among undergraduates who received explicit reproach feedback after completing a lab-based cognitive task. Compared to participants who received verbal praise or no feedback, those who had their performance verbally reproached reported a lower sense of competence and intrinsic motivation regarding their task. With respect to pro-environmental behaviours, reproach feedback may therefore serve to reduce individuals’ intrinsic motivations to engage in such behaviours. Because of the importance of intrinsic motivations for yielding sustainable, long-term changes to behaviour (Deci & Ryan, 1987), this suggests that reproach feedback has little value for the purpose of bringing about meaningful changes to individuals’ pro-environmental behaviours. Accordingly, I turn to consider alternatives to using reproach as a means of motivating pro-environmentalism.

Praise as a motivator of pro-environmental behaviours

Supporters of pro-environmental action may consider it both contradictory and counterproductive to praise individuals’ behaviours when, to date, the collective pro-environmental efforts of individuals in the developed world have fallen far below the requirements of long-term sustainability (Wackernagel & Rees, 1996). Although neutral, non-reproachful framing is occasionally used to convey feedback on environment-related behaviours (e.g., Global Footprint Network, 2011), there are few, if any, prominent examples of praise-framed pro-environmental feedback. From the feedback recipient’s perspective, however, praise may be better-suited to motivating actual pro-environmental behaviours. A significant body of research in the area of organizational behaviour management indicates that praise improves the subsequent performance of employees who consistently receive such positively-valenced feedback from supervisors (Eikenhout & Austin, 2004; Lowman, 1997; Rice, Austin & Gravina, 2009). Much of this research focuses on customer service behaviours that include employee
efforts at greeting, assisting and engaging in conversations with customers in a retail atmosphere. In a study that examined a large retail organization over the course of roughly 4 months, Eikenhout and Austin (2004) found that the frequency of customer service behaviours improved significantly after supervisors simply provided employees with consistent informational feedback that quantified their performance in various categories of customer service. When these same employees were regularly provided with praise feedback regarding these behaviours in addition to informational feedback, a further significant increase in customer service behaviours was observed. This finding suggests that consistently administered praise is an effective motivator of future behaviours. In a separate study, bank tellers also showed improved customer service behaviours when they received an intervention that provided both informational feedback and praise (Crowell, Abel, Anderson & Sergio, 1988). Like Eikenhout and Austin (2004), these researchers found that consistent social praise led to increases in customer service performance above the levels that were achieved by informational feedback alone. In a similar intervention study carried out using employees at a grocery store, Rice and colleagues (2009) found that increased performance of customer service behaviours remained apparent even forty-eight weeks after the intervention had been administered. These behaviours were maintained despite the fact that the store manager did not continue to give employees regular social praise after the discontinuation of the experimenters’ intervention. It can therefore be concluded that praise feedback has both a significant and lasting impact on individuals’ future behaviours. Importantly, each of these studies established the importance of providing praise alongside informational feedback. That is, individuals should be made aware of performance criteria in order for praise to effectively motivate future behaviours. Like pro-environmental behaviours, customer service behaviours require individuals to make extra efforts in order to benefit a collective interest. Much like an individual who is environmentally friendly, an employee who expends extra effort
on customer service does not experience any immediate gains even though his or her employer will certainly benefit from these efforts in the long run. When praise follows efforts in customer service, however, employees also realize immediate personal gains from these efforts, thus motivating similar behaviours in the future. If a similar contingency holds for pro-environmental behaviours, then these behaviours will be similarly motivated by praise feedback.

Additional research indicates that praise feedback is an effective motivator of behaviours in a variety of areas beyond customer service. In a factory setting, researchers who applied an intervention that supplied informational feedback followed by consistent praise found that the addition of social praise significantly increased the output of workers in a furniture manufacturing plant (Wikoff, Anderson, & Crowell, 1982). Researchers who used a similar intervention at an insurance company found that social praise was effective at reducing employee absenteeism (Silva, Duncan, & Doudna, 1981). Outside of the workplace, the performance of competitive athletes has also been found to improve in response to praise feedback. Using an intervention where social praise followed informational feedback (i.e., information regarding personal performance), researchers found that praise from coaches had a significant impact on players’ subsequent performance. Specifically, the members of a university hockey team showed significant increases in legal body-checking behaviour, an important component of effective team performance, after receiving praise for this behaviour (Anderson, Crowell, Doman & Howard, 1988). A correlational study that compared the strategies favoured by various high school sports coaches and actual winning percentages also found that the most successful coaches were those who offered the most praise and encouragement to their players (Feltz, Chase, Moritz, & Sullivan, 1999). Although it is not possible to make any definitive causal claims on the basis of such a correlation, using praise does consistently appear to be part of a winning strategy when it comes to motivating desired behaviours. Indeed, individuals who
receive praise feedback are found to possess higher intrinsic motivations and greater levels of persistence, particularly when these individuals are aware that they have been outperformed by others (Mumm & Mutlu, 2011). In contrast to this, reproach feedback serves to discourage behaviours, particularly when individuals are aware that they are being outperformed by others (Vallerand et al., 1986). However, most intervention studies that examine praise do not directly compare this form of feedback against reproach feedback. This is likely a consequence of testing interventions in a natural setting, where a haphazard use of reproach may have an adverse impact on outcomes such as employee performance, business revenues and athletic team performance.

In contrast to this, in my dissertation I directly compared the effectiveness of praise and reproach feedback. Following from the findings of research in organizational and sports settings described above, I expected that feedback praising individuals’ pro-environmental behaviours would motivate increases in pro-environmental behavioural intentions. On the other hand, I expected that reproach feedback would fail at motivating increases in pro-environmental behavioural intentions. In line with the predictions of self-determination theory, I predicted that reproach feedback would reduce pro-environmental behavioural intentions, where it had any effect at all.

**The effect of praise on identification with pro-environmental issues**

In addition to increasing individuals’ willingness to engage in pro-environmental behaviours, praise feedback should also bring individuals to identify more with pro-environmental issues. The reproachful pro-environmental feedback found in online tools such as *EcoGuro* produces a negative affective response that is characterized by feelings such as shame and guilt (Carter, 2011). Carter (2011) and others (Kals, Schumacher, & Montada, 1999; Kellert, 1997; Mayer & Frantz, 2004) suggest that positive affect, which capitalizes on emotions such as hope, awe and love, may be better suited to facilitating a genuine interest in the environment. In accordance with Fredrickson’s (2001) broaden-and-build theory, these researchers argue that
negative emotions result in an enclosed, protective sense of self in which individuals are primarily motivated by pleasures afforded through materialistic goals. Materialistic goals, which are more oriented toward consumption, are often considered opposite to pro-environmental interests (Stern, Dietz & Guagnano, 1998). Positive affect, on the other hand, broadens an individual’s sense of self to incorporate his or her relationships and surroundings, causing the individual to be more motivated by pleasures afforded through connection with others and the natural world. As this latter frame of mind incorporates a sense of connectedness to one’s natural surroundings, it is more amenable to assigning high value to environmental issues and concerns (Carter, 2011; Mayer & Frantz, 2004). Individuals are known to experience positive affect after receiving praise (Joireman et al., 2009). Praise should therefore facilitate a state of mind that is more amenable to a sense of personal involvement with pro-environmental issues.

In general, individuals also prefer to see themselves cast in a favourable, self-enhancing light (Swann, Pelham & Krull, 1989; Taylor & Brown, 1988). Thus, individuals tend to respond to favourable evaluations from others by adopting more favourable opinions of those others and the causes they represent (Johnson, Gardner, & Wiles, 2004). The opposite outcome occurs when individuals receive negatively-valenced feedback, which is met with less acceptance and defensive avoidance of the source of feedback (Fedor, Eder & Buckley, 1989; Snyder & Newburg, 1981). Individuals are thus repulsed by the content and source of reproach feedback but drawn to the content and source of praise feedback. With respect to feedback that concerns environment-related behaviours, this attraction, combined with a broadened mindset facilitated by positive affect, should cause individuals who receive praise to identify more closely with pro-environmental issues and organizations.
The effect of praise on support for environmental preservation efforts

The distinct content of praise feedback should also increase the extent to which individuals believe that environmental preservation efforts are efficacious and worthwhile. An integral characteristic of reproachful evaluations such as those conveyed by the WWF’s (2009) *EcoGuru* interface is that such feedback either downplays or completely ignores the cumulative effects of individuals’ past pro-environmental behaviours. This characteristic is usually integral because, in order for feedback to convey reproach, that feedback *must* decry some past behaviour. As a general example, many online feedback interfaces convey reproachful feedback that highlights how excessively an individual consumes resources (e.g., “If everyone on the planet lived your lifestyle, we would need 4 Earths;” Center for Sustainable Economy, 2012). The reproachful nature of such feedback relies on highlighting the inadequacy of past behaviours at serving pro-environmental goals. Alternatively, if such feedback referred to the cumulative efficacy of past pro-environmental behaviours (e.g., “you have done a good job of saving energy, but your overall pro-environmental performance is poor”), then this feedback would be less reproachful and, indeed, would incorporate an element of praise to the extent that the efficacy of past pro-environmental behaviours is mentioned. The sorts of feedback conveyed by numerous online evaluation interfaces can be characterized as entirely reproachful, as these treat past pro-environmental behaviours as solely inadequate and wasteful (e.g., The Daily Green, 2007; Center for Sustainable Economy, 2012; WWF, 2009). Praise feedback therefore has the advantage of not framing pro-environmental behaviours as daunting tasks in which past efforts have met with failure. Rather, praise may be used to highlight the large-scale cumulative effects of an individual’s past pro-environmental efforts and the ways that these are significant and meaningful relative to the scale of environmental problems.
Having been made aware of the cumulative impact of his or her pro-environmental behaviors, an individual will be more inclined to believe that his or her pro-environmental actions are efficacious. After having undergraduate students solve a series of mathematics problems, for example, Kirschenbaum and Karoly (1977) found that students who simply anticipated success feedback were left with greater feelings of efficacy and positive affect relative to students who had anticipated failure feedback. The belief that they were on the verge of success led individuals to feel more confident in the efficacy of their actions. In contrast, those who believed that they were on the verge of failure and thereby far from success became less confident in the efficacy of their actions. Additional research that had students complete a series of problem-solving tasks found that students who were led to perceive their goals as more proximal (i.e., on the verge of being achieved) felt that their problem-solving efforts were more efficacious than students who were led to perceive their goals as more distal (i.e., far from being achieved; Stock, & Cervone, 1990). Similarly, in a naturalistic workplace situation, employees of a large toy manufacturing company experienced a greater sense of efficacy when goals were proximal but not when goals were distal (Latham & Seijts, 1999). Because highlighting the effectiveness of past pro-environmental behaviors is integral to praise and not to reproach feedback, only individuals who receive praise feedback should feel that they have already done a great deal to help the environment, making pro-environmental goals seem more proximal to these individuals. In other words, the capacity for praise feedback to highlight past achievements should lead individuals to feel that they are further along the way when it comes to “doing their part” for the environment. Accordingly, praise feedback should be more effective than reproach feedback at convincing individuals that environmental preservation efforts are, in themselves, both efficacious and worthwhile as a means of addressing challenges faced by the environment.
In my final two studies, I addressed the possibility that the effectiveness of praise and reproach feedback may differ according to the regulatory concerns of the individuals who receive this feedback. According to Shah, Higgins and Friedman (1998), individuals are disposed to focus on the pursuit of particular types of goals and, accordingly, to favor strategies that accord with these goals. The type of goals that an individual focuses on can be broadly categorized as oriented towards either promotion or towards prevention (Higgins, 1997, 1998). Promotion-oriented goals are characterized by the achievement or non-achievement of gains, and are associated with emotions ranging from eagerness to dejection. Prevention-oriented goals are characterized by the avoidance or non-avoidance of losses, and are associated with emotions ranging from quiescence to agitation. Prevention- and promotion-oriented goals are entrenched in human experience from a very young age: Promotion-oriented goals stem from nurturance needs that motivate the pursuit of ideals (i.e., personally desirable outcomes) whereas prevention-oriented goals stem from safety needs that motivate the pursuit of oughts (i.e., socially prescribed outcomes; Shah et al., 1998).

A dispositionally promotion-focused individual is primarily concerned with promotion-oriented goals, whereas a prevention-focused person is primarily concerned with prevention-oriented goals. Accordingly, a promotion-focused individual is inclined to pursue maximal goals, which reflect gains that the individual hopes to achieve. On the other hand, a prevention-focused individual is inclined to pursue minimal goals, which reflect losses the individual ought to avoid (Idson, Liberman & Higgins, 1999). Each type of individual understands information to be salient based upon how well that information corresponds to the sorts of goals that constitute his or her focal regulatory concerns (Lockwood, Jordan & Kunda, 2002). Hence, a promotion-focused individual finds information that highlights the presence or absence of gains to be most
salient. Similarly, a prevention-focused individual finds information that highlights the presence or absence of losses to be most salient.

Although feedback can be framed in either promotion (“you are doing a great job of achieving environmental gains”) or prevention (“you should be concerned about environmental losses you are causing”) terms, most feedback used in existing pro-environmental communications is framed in prevention terms: That is, individuals are informed about the environment and pro-environmental behaviours in terms characterized by losses rather than gains. That is, both popular media and pro-environmental advocates tend to address matters of the environment in terms of waste (e.g., Wackernagel & Rees, 1996), damage to natural spaces (e.g., Gore, 2006) and the potential for ecological disaster (e.g., Rees, 2003). This approach to addressing the environment in public discourse fits the concerns of prevention-focused individuals. There are comparatively few, if any, examples of popular media that frame environmental matters in terms of achieving hopes, aspirations or ideals. Moreover, evidence suggests that the majority of North Americans are more promotion- than prevention-focused: They are more likely to be concerned with gains and nongains than with losses and non-losses (Lee, Aaker & Gardner, 2000). Because promotion-focused individuals adopt strategies aimed at achieving gains, they are unlikely to be motivated by feedback chastising them for causing losses. As a result, North Americans may be relatively unlikely to respond to the typical feedback communicated by pro-environmental advocates. A promotion-focused individual who is warned that he or she is using resources as though there are “2.6 Earths” (WWF, 2009) may be ill-disposed to use such feedback as a basis for behavioural change. Where there is a poor fit between an individual’s regulatory focus and the strategies emphasized by feedback (i.e., focusing on achieving gains or avoiding losses), feedback is unlikely to have the desired effect (see Cesario et al., 2008; Higgins, 2000). Accordingly, more promotion-focused individuals
should find gain-framed feedback as salient to their goals whereas more prevention-focused individuals should find loss-framed feedback salient to their goals.

In order for praise feedback to motivate pro-environmental behavioural intentions and increase other pro-environmental inclinations, individuals must first be motivated to consider praise feedback as useful, salient information. As outlined above, Higgins’ (1997, 1998) regulatory focus theory establishes that promotion-focused and prevention-focused individuals attribute differing levels of salience to gain-framed and loss-framed information. My research is the first to directly test the relationship between individuals’ regulatory concerns and responses to praise and reproach feedback; specifically I examined whether promotion- and prevention-focused individuals would respond differently to praise and reproach feedback regarding daily environment-related behaviours that was framed in terms of either environmental gains or environmental losses. A more promotion-focused individual should find feedback concerning gains that may be achieved or nongains that may be averted to be more relevant to pursuing his or her goals. A more prevention-focused individual, on the other hand, should find feedback concerning losses that may be incurred or non-losses that may be maintained as more relevant to the pursuit of his or her goals (Cesario, Higgins & Scholer, 2007; Idson et al., 2000). At the same time, a promotion-focused individual who experiences salient praise will feel eager as a result whereas a prevention-focused individual who experiences salient praise will only feel a sense of quiescence (Higgins, 1997, 1998). Accordingly, only the promotion-focused praise recipient will be motivated to take action in response to such feedback. In response to salient reproach, on the other hand, a promotion-focused individual should experience dejection while a prevention-focused individual will experience agitation. On the face of it, reproach feedback should therefore be particularly motivating to prevention-focused individuals. Despite this, past research generally reveals that reproach feedback is poorly suited to motivating behaviour (Rogers &

Accordingly, where regulatory-focus is concerned, only gain-framed praise feedback is expected to be particularly motivating to dispositionally promotion-focused individuals.

**Hypothesized effects of feedback on individuals’ pro-environmental inclinations**

In a series of five studies, I set out to compare the effects of reproach and praise feedback in order to determine how each would influence individuals’ pro-environmental behavioural intentions, identification with pro-environmental issues and support for environmental preservation efforts as well as to determine how each type of feedback would interact with regulatory focus to influence these outcomes. Finally, I examined both general and behaviour-specific praise and reproach feedback to determine whether pro-environmental responses could be more effectively influenced by the latter feedback format.

I first examined whether general feedback regarding individuals’ everyday environment-related behaviours would be more effective when framed as praise or as reproach (Study 1). I also considered the possibility that the effectiveness of praise feedback might be undermined either by the limitations of general feedback with respect to providing individuals with a clear sense of how evaluations result from their individual behaviours affected large-scale environmental outcomes. Accordingly, I conducted an additional set of studies to assess whether praise would be especially effective when individuals received praise feedback that made the possibility of future improvement explicit (Study 2), and praise feedback targeted to specific environment-related behaviours (Studies 3, 4 and 5). In each of these studies, I examined the effectiveness of praise and reproach feedback at increasing participants’ pro-environmental inclinations (i.e., identification with pro-environmental issues, support for environmental preservation efforts, pro-environmental behavioural intentions). I predicted that praise would increase participants’ pro-environmental inclinations relative to reproach feedback (Study 1) and
this effect would be strongest when individuals were reminded of room for improvement (Study 2) and given feedback about specific behaviours (Studies 3, 4 and 5). Finally, to consider the effects of other forms of positive feedback framing, I examined the possibility that praise would be most effective at increasing the pro-environmental inclinations of more promotion-focused individuals (Studies 4 and 5).

It is important to note that the feedback provided to participants across all studies was always accurate and never contrived. The manipulation in each study focused on the evaluative framing of accurate feedback: as a form of praise, a form of reproach or as neither in the case of controls. In other words, each study investigated the impact of accurate feedback given from different evaluative perspectives (i.e., more generous versus more critical) upon subsequent pro-environmental inclinations. Each experimental manipulation entailed solely providing one feedback valence in order to: (1) Imitate the approach taken by modern pro-environmental advocates; and (2) Clearly test of the effects of each feedback valence. The second point is particularly significant because this is the first study to examine the effects of feedback framing on pro-environmental inclinations, making it important to begin by investigating the effects of each feedback valence apart from others.

Study 1

In Study 1, I compared the impact of praise and reproach feedback by examining the effects of each type of feedback on pro-environmental behavioural intentions, identification with pro-environmental issues and support for environmental preservation efforts. I tested feedback that mirrored the format employed by online evaluation tools such as EcoGuru (WWF, 2009) and the Ecological Footprint Calculator (Center for Sustainable Economy, 2012). Participants in this study first quantified various everyday behaviours that had an effect on environmental
outcomes and then received a single, general piece of feedback that evaluated the total pro-environmental quality of all reported behaviours.

I hypothesized that praise but not reproach feedback would increase pro-environmental behavioural intentions, identification with pro-environmental issues and support for environmental preservation efforts relative to baseline.

Methods

Participants

This study employed a sample of participants who were either recruited using Amazon Mechanical Turk or recruited from an introductory undergraduate psychology class.

Mechanical Turk Sample. Participants were 166 English-speaking native residents of the United States who were recruited via Amazon Mechanical Turk. Participants took part in the study in exchange for a small payment of $1.00. Amazon Mechanical Turk is a web-based resource that helps connect researchers to a large pool of interested potential research subjects who complete online studies from the privacy of their personal computers (Bohannon, 2011). This resource is increasingly used as a data collection tool in the social sciences and has been found to yield valid data from an interested and engaged participant pool (Bohannon, 2011; Paolacci, Chandler & Ipeirotis, 2010). The decision to only include data from residents on the United States was partly the result of the restrictions of Mechanical Turk itself. To ensure that the cultural background of participants who participated in studies via Mechanical Turk did not significantly differ from that of the Canadian participants who participated in my other, lab-based studies, a Canadian sample was first sought using Mechanical Turk’s built-in filters. This

1 This was a “cleaned” sample of Mechanical Turk participants. All participants who gave incomplete responses to questionnaires, provided mock responses, or had obvious difficulties with English were excluded immediately without further consideration. These same exclusion procedures were followed in all subsequent studies that recruited participants via Mechanical Turk.
approach yielded little data, likely due to the relatively small number of Canadians who were registered as users of Mechanical Turk at the time of this study. Accordingly, I used a sample composed of residents of the United States, who share Canadians’ understanding of pro-environmental issues as a matter of changing social norms and public policies and not a concern driven by an immediate physical reality (as is the case in poorer countries that are more directly affected by pollution and climate-based catastrophes; Brechlin, 1991).

In total, 96.4% of participants fell into the age range of 18-59 years. A total of six participants were excluded from analyses.² The excluded participants, each aged 60 years or older, were found to be more than two standard deviations above the mean participant age in my sample. After exclusions, the study sample consisted of 160 (60 Male, 97 Female, 3 not reported) participants. Participants’ ages ranged from 18 to 59 (M = 32.22; SD = 11.728). The ethnic composition of the sample was primarily Caucasian (80.4%), with the remainder of participants divided evenly across Latin American and various Asian backgrounds.

² Prior to data collection, it was determined that analyses would focus on young and middle-aged adults. This was, in part, due to the expectation that participants over the age of 60 belonged to a cohort that understood matters of the environment differently from younger cohorts. To most North Americans, “nature” is primarily an idea that is understood in terms of personal memories and social values (Brechlin, 1991; Clayton & Brook, 2005). Because significant changes in social values concerning the natural environment are known to have taken place roughly forty years ago (Dunlap, 1991), it is reasonable to assume that adults who were over the age of 60 at the time of this study may have a fundamentally different understanding of what is meant by “nature” and one’s relationship to it. Specifically, this cohort should be more likely than younger cohorts to hold the view that “nature” is a resource that is meant to be exploited for human needs and not a personal responsibility (Dunlap, 1991). In addition to cohort effects, age effects may also cause older adults to have drastically different views of environmental issues than young and middle-aged adults. Older adults are known to be significantly more socially conservative than younger adults. In particular, there is a marked increase in conservatism scores among individuals over the age of 50 years (Truett, 1993). Conservatism, in turn, is associated with a lower tendency to endorse pro-environmental values and initiatives (Hodgkinson & Innes, 2000; Ray & Hall, 1995). Compared to younger individuals, those over the age of 60 should therefore be more inclined to social conservatism and thereby far less inclined to support pro-environmental actions and causes. Given the fact that older adults make far less use of the internet than younger age groups (Zickuhr & Madden, 2012), the decision to exclude participants over 60 years of age was not expected to significantly impact upon sample size. This study and each subsequent study therefore excluded participants aged 60 and above in order to ensure that all analyses were free of the above-illustrated age and cohort effects.
Introductory Psychology Student Sample. Participants were 102 (37 Male, 65 Female) introductory psychology students at the University of Toronto. Participants took part in the study in exchange for course credit. Participants’ ages ranged from 16 to 24 ($M = 18.79$, $SD = 2.31$). The ethnic composition of the sample was mostly East Asian (45.9%) and Caucasian (23.5%), with the remainder of participants belonging to South Asian (11.2%) and various other backgrounds.

Procedure

Mechanical Turk Sample. Individuals registered as “Workers” on Amazon Mechanical Turk were recruited to complete an “Environmental Behaviour Questionnaire.” Participation in this study required that Workers had a minimum 95% approval rating from other requesters (Mechanical Turk identifies researchers as “requesters”). Those who chose to participate were asked to read an online consent form and to accept its terms by clicking a radio button. Each participant who gave his or her consent was directed via hyperlink to an online questionnaire hosted by surveymonkey.com.

Introductory Psychology Student Sample. Using a recruitment website, participants signed up to participate in a “social psychology study.” Each participant attended a laboratory at an appointed time and completed two questionnaires that were administered using MediaLab v.2010.2 (Empirisoft, 2011). Participants were provided with a brief tutorial on using the computerized questionnaire and were advised to read questions carefully and respond accurately.

All participants were randomly assigned to receive one of three forms of feedback: reproach feedback, praise feedback or no feedback (control condition). Participants were first asked to complete 21 questions concerning everyday environment-related behaviours (e.g., “In an average week, how many times do you use a reusable bag instead of using a plastic bag?”; see Appendix A for full questionnaire). After all responses were submitted, each participant received
a single, general message that evaluated his or her overall pro-environmental performance level. Participants in the reproach feedback condition received the following message: “Ouch! Your responses indicate that you are a poor performer when it comes to reducing waste and helping the environment. This is a troubling result.” Those in the praise feedback condition received the message: “Congratulations! Your responses indicate that you are a strong performer when it comes to reducing waste and helping the environment. Well done.” Participants in the control condition completed questions regarding their everyday behaviours but did not receive any feedback.

After receiving feedback about their performance, participants completed a second, longer computerized questionnaire that required numeric responses to a series of scale items that measured participants’ personal pro-environmental inclinations. This questionnaire consisted of three separate measures. First, participants completed a scale that measured pro-environmental behavioural intentions (Bashir, Lockwood, Dolderman, Sarkissian & Quick, 2011). Items in this scale assessed participants’ intentions to engage in behaviours ranging from daily water conservation to the pursuit of a career related to improving the state of the environment. Participants responded to each of 38 statements (e.g. “I plan to buy products that have less packaging, whenever possible”) using a Likert Scale with response options ranging from 1 (strongly disagree) to 7 (strongly agree; Mechanical Turk Cronbach’s α = .969; Student sample Cronbach’s α = .960).

Next, participants completed a 10-item measure of their identification with pro-environmental issues. This 10-item measure was designed to assess participants’ inclinations toward identifying themselves as pro-environmental individuals (e.g., “Helping to protect the environment is a central part of my identity”). Participants rated their agreement with each item
on a scale ranging from 1 (strongly disagree) to 5 (strongly agree); Mechanical Turk Cronbach’s $\alpha = .806$; Student sample Cronbach’s $\alpha = .891$).

Finally, participants completed the Environmental Attitudes Inventory (EAI; Milfont & Duckitt, 2010), a 120-item measure consisting of items pooled from numerous major measures of environmental attitudes (e.g., The Ecology Scale (Maloney & Ward, 1973); The Environmental Concern Scale (Weigel & Weigel, 1978); The New Ecological Paradigm (Dunlap, Van Liere, Mertig, & Jones, 2000)) as well as items developed on the basis of contemporary findings regarding environmental attitudes (e.g., Milfont & Duckitt, 2004; Wiseman & Bogner, 2003). In total, the EAI consists of twelve 10-item subscales, each accounting for a specific facet of pro-environmental attitudes (e.g., enjoyment of nature, faith in technology, support for population-control policies; Milfont & Duckitt, 2010). Participants rated their agreement with each item on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). For the purposes of the studies that composed this dissertation, my analyses focused on two EAI subscales that specifically reflected participants’ support for environmental preservation efforts. The EAI personal conservation behaviour subscale consists of items that address the value one places on limiting one’s own everyday consumption of various resources (e.g., “In my daily life I try to find ways to conserve water or power.”); Mechanical Turk Cronbach’s $\alpha = .835$; Student sample Cronbach’s $\alpha = .817$). Higher scores on these items reflect greater support for pro-environmental change. The EAI human utilization of nature subscale addresses one’s sense of entitlement to make use of environmental resources (e.g., “The benefits of modern consumer products are more important than the pollution that results from their production and use.”); Mechanical Turk Cronbach’s $\alpha = .871$; Student sample Cronbach’s $\alpha = .806$). Higher scores on this scale reflect greater support for environmental preservation. The remaining EAI subscales (e.g., confidence in science and technology, support for population growth policy) did not specifically deal with
individuals’ perspectives on environmental resource usage and were only examined for exploratory purposes among participants recruited via Mechanical Turk.

After having completed each set of questions (i.e., pro-environmental behavioural intentions, identification with pro-environmental issues and the EAI), participants responded to a brief questionnaire regarding personal background and demographic characteristics. Following this, each participant was provided with a debriefing package that included an explanation of the purpose of this study.

Results

Behavioural intentions scale

I first examined how a single, general piece of feedback conveying praise or reproach would affect participants’ pro-environmental behavioural intentions. A one-way ANOVA revealed a significant effect of feedback condition on pro-environmental behavioural intentions ($F(2, 261) = 3.411, p = .035, \eta^2 = .026$). Using Fisher’s (1935) Protected Least Significant Difference Test, pairwise comparisons revealed that the pro-environmental behavioural intentions of participants who received reproach feedback fell significantly below those of controls ($p = .010, \eta^2 = .045$) and non-significantly below those of praise recipients ($p = .182, \eta^2 = .008$; See Table 1 for means and standard deviations). Participants who received praise feedback, however, did not indicate significantly more pro-environmental behavioural intentions than did controls ($p = .119, \eta^2 = .015$).

Identification with pro-environmental issues

I next examined how a single, general piece of feedback conveying praise or reproach would affect participants’ inclinations to identify with pro-environmental issues. A one-way ANOVA revealed a significant effect of feedback conditions on identification with pro-environmental issues ($F(2, 261) = 11.051, p < .001, \eta^2 = .079$). Participants who received
reproach feedback rated themselves significantly less identified with pro-environmental issues than both recipients of praise feedback \( (p < .001, \eta^2 = .082) \) and controls \( (p = .001, \eta^2 = .076) \); See Table 1 for means and standard deviations). Participants who received praise feedback did not indicate greater identification with pro-environmental issues than did controls \( (p = .837, \eta^2 < .001) \).

**Support for environmental preservation efforts**

I next examined how a single, general piece of feedback conveying praise or reproach would affect participants’ support for environmental preservation efforts, as measured by EAI scales of participants’ opposition to *human utilization of nature* and support for *personal conservation behaviour*. A one-way ANOVA revealed no significant effect of feedback conditions on the EAI *human utilization of nature* subscale \( (F(2, 261) = .714, p = .491, \eta^2 = .006) \) or support for *personal conservation behaviour* subscale \( (F(2, 261) = 1.456, p = .235, \eta^2 = .011) \); See Table 1 for means and standard deviations).

**Sample as a moderator**

To determine whether it was valid to examine participants recruited via Mechanical Turk and through an introductory psychology research pool together, I examined whether the form of participant recruitment moderated the relationships described above. Results showed that recruitment method (Mechanical Turk or Introductory Psychology Student Pool) did not moderate the effects of feedback valence on pro-environmental behavioural intentions \( (F(2, 261) = 1.148, p = .319, \eta^2 = .009) \), identification with pro-environmental issues \( (F(2, 261) = .332, p = .718, \eta^2 = .002) \), the EAI *human utilization of nature* subscale \( (F(2, 261) = .176, p = .839, \eta^2 = .001) \) or the EAI *personal conservation behaviour* subscale \( (F(2, 261) = .496, p = .610, \eta^2 = .004) \). These findings support the decision to examine the effects of feedback valence among a
combined sample of participants, which affords greater statistical power to detect differences than examining these samples separately.

**Exploratory analyses**

For exploratory purposes, a one-way ANOVA was also carried out on each of the remaining ten EAI subscales (solely among the Mechanical Turk sample), in order to examine whether general reproach or praise feedback affected scores on any pro-environmental inclination that was not otherwise singled out by my initial hypotheses. Of these, no subscale demonstrated significant differences between feedback conditions (for all ten ANOVAs, \( .138 < p < .892 \)).

**Discussion**

Study 1 found that reproach feedback led to reductions in pro-environmental behavioural intentions relative to baseline and reductions in identification with pro-environmental issues relative to both baseline and praise feedback. This was inconsistent with the prediction that reproach would result in participants feeling helpless and unpleasant, causing them to ignore this type of feedback (as in Fedor et al., 1989; Snyder & Newburg, 1981). The actual pattern of findings suggests that participants had a more active oppositional response to the reproach feedback that they received, a response that is consistent with self-determination theory. According to self-determination theory (see Deci & Ryan, 1987), participants who receive reproach feedback will be less motivated to engage in pro-environmental behaviours and less inclined to identify with pro-environmental issues (as in Vallerand & Reid, 1984, 1988). This finding ought to be troubling for pro-environmental advocates who make use of general reproach feedback as a means of persuading individuals to become more engaged with pro-environmental activities. These results suggest that such feedback may actually cause recipients to become less inclined to identify with pro-environmental issues or to act accordingly.
Contrary to my initial hypothesis, general praise feedback failed to increase scores on any measure of pro-environmental inclinations above baseline levels. One reason for this may be that participants who received general praise feedback felt complacent towards taking on pro-environmental responsibility above their current, apparently laudable, levels. If praise indicates that one is already performing well, then why should one feel inclined to do more? I addressed this possibility in Study 2.

Study 2

One plausible explanation for the finding in Study 1 is that the type of praise feedback utilized and tested in that study brought about a sense of complacency in participants with respect to both pro-environmental behaviours and other, more general pro-environmental inclinations. That is, general praise feedback may have simply failed to increase pro-environmental inclinations above baseline levels because these messages did not explicitly state the need to increase future pro-environmental efforts. As such, recipients of general praise feedback may have been left to feel that they were performing “well enough” and that change was not needed (Karau & Williams, 1993). In other words, participants who received praise may have reasoned that if their current efforts toward being environmentally friendly were sufficient to merit praise, then it would be unnecessary to exert additional effort toward being more pro-environmental. When praise feedback does not explicitly state a need for continual improvement, such feedback may inadvertently justify a complacent approach to pro-environmental inclinations. Additionally, praise messages imply that the average individual acts in a less pro-environmental fashion than the individual receiving praise. In other words, a participant who receives praise is led to understand that his or her performance is above average, leaving this participant with the impression that his or her own behaviours and concerns for the environment have exceeded the descriptive norms established by the performance level of average individuals.
(Cialdini, Reno, & Kallgren, 1990; Göckeritz, Schultz, Rendón, Cialdini, Goldstein & Griskevicius, 2010). This interpretation is particularly troublesome for the persuasive effectiveness of praise as it suggests that, in at least some circumstances, individuals who receive praise may actually reduce their pro-environmental behaviours as well as other pro-environmental inclinations.

In Study 2, feedback was designed to overcome the barrier of participant complacency by incorporating a brief passage indicating room for improvement in participants’ pro-environmental performance. If the added indication of “room for improvement” raised the pro-environmental scores of praise recipients above control levels and above the levels of those who received “plain” praise, then this would be taken as confirmation of the significant role of complacency at reducing the effectiveness of praise feedback.

Methods

Participants

Participants were 216 (104 Male, 110 Female, 2 not reported) English-speaking residents of the United States recruited via Amazon Mechanical Turk. Participants took part in the study in exchange for a small payment. Participants’ ages ranged from 18 to 59 ($M = 34.00; SD = 12.426$). The ethnic composition of the sample was primarily Caucasian (81.9%), with the remainder of participants divided evenly across Latin American, Black American and various Asian backgrounds.

Procedure

The same selection and consent procedure employed in Study 1 was used to recruit participants via Amazon Mechanical Turk. The independent manipulation once more asked

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3 Following the criteria set forth in Study 1, two participants over the age of 60 were excluded from analyses
participants to complete a questionnaire consisting of 21 open-ended questions regarding the quantity and frequency of various everyday behaviours that affected the environment (e.g., “In an average week, how many times do you use a reusable bag instead of using a plastic bag?”). Once all responses were submitted, a single general feedback message was provided. Each participant was randomly assigned to one of four feedback conditions, or to a control condition. Two of the feedback conditions provided the same feedback messages as in previous studies; these were simple reproach (i.e., “Ouch! Your responses indicate that you are a poor performer when it comes to reducing waste and helping the environment. This is a troubling result.”) and simple praise (i.e., “Congratulations! Your responses indicate that you are a strong performer when it comes to reducing waste and helping the environment. Well done.”). Two additional feedback conditions provided participants with these same messages along with an appended phrase indicating that there was room for improvement with respect to future pro-environmental performance (i.e., “…Your score, however, indicates that there is still room for improvement. Remember, there is always more you can do to help the environment!”). Participants who were randomly assigned to the control condition did not receive a feedback message.

Next, all participants completed the same dependent measures as in Study 1 (i.e., Pro-environmental behavioural intentions (Cronbach’s α = .969); Identification with pro-environmental issues (Cronbach’s α = .898); EAI human utilization of nature subscale (Cronbach’s α = .909); EAI personal conservation behavior subscale (Cronbach’s α = .880)). Participants also responded to a brief questionnaire regarding personal background and demographic characteristics. Following this, each participant was provided with a debriefing package that included an explanation of the purpose of this study.
Results

**Behavioural intentions scale**

A one-way ANOVA revealed no significant effect of feedback conditions on participants’ pro-environmental behavioural intentions \((F(4, 211) = 1.563, p = .185, \eta^2 = .029).\) This finding shows no increase in pro-environmental behavioural intentions resulting from feedback messages that made explicit reference to room for improvement in future pro-environmental performance.

**Identification with pro-environmental issues**

A one-way ANOVA revealed a significant effect of feedback conditions on participants’ identification with environmental issues \((F(4, 211) = 2.703, p = .032, \eta^2 = .051).\) A protected Fisher’s (1935) Least Significant Difference Test revealed that participants who received praise feedback that suggested room for improvement rated themselves as more identified with pro-environmental issues than participants who received reproach feedback with room for improvement \((p = .016, \eta^2 = .065).\) Because Fisher’s (1935) test inflates familywise error rate if used to compare the more than three different means, using the test to compare five group means while maintaining familywise alpha at .05 requires adopting a more strict alpha level of .01 when comparing mean differences (Hayter, 1986). The mean difference between the scores of participants who received praise feedback with room for improvement and reproach feedback with room for improvement can therefore only be considered as marginally significant.

Participants who received praise feedback with room for improvement also did not significantly differ those who received simple reproach feedback \((p = .095 \eta^2 = .035),\) simple praise feedback \((p = .150, \eta^2 = .032)\) or controls \((p = .722, \eta^2 = .009)\) with respect to scores of identification with pro-environmental issues (See Table 2 for means and standard deviations). These findings fail to
indicate that complacency plays a role in preventing general praise feedback from increasing participants’ identification with pro-environmental issues.

Participants who received simple reproach were less identified with pro-environmental issues than controls (\( p = .048, \eta^2 = .046 \)). However, Fisher’s (1935) protected Least Significant Differences test indicated that this difference did not reach significance based on using alpha < .01 as a criterion to correct for multiple comparisons.

**Support for environmental preservation efforts**

A one-way ANOVA revealed a significant effect of feedback conditions on participants’ scores on the EAI *human utilization of nature* subscale (\( F(4, 211) = 2.437, p = .049, \eta^2 = .044 \)). Participants who received praise feedback indicating room for improvement rated themselves as significantly more pro-environmental than recipients of simple praise feedback (\( p = .004, \eta^2 = .105 \)). Using a strict alpha-level of .01 to control for familywise error, the scores of participants who received praise with room for improvement did not significantly exceed the scores of controls (\( p = .214, \eta^2 = .020 \)) or of those who received either simple reproach feedback (\( p = .063, \eta^2 = .049 \)) or reproach feedback that suggested room for improvement (\( p = .030, \eta^2 = .050 \); See Table 2 for means and standard deviations). There was no significant difference between controls and those who received either simple reproach (\( p = .537, \eta^2 = .005 \)) or praise (\( p = .110, \eta^2 = .031 \)). The greater scores of participants who received praise feedback alongside explicit reference to room for improvement suggests that complacency plays a role in affecting this particular dimension of participants’ support for environmental preservation efforts. With respect to scores on the EAI *personal conservation behaviour* subscale, one-way ANOVA revealed no significant effect of feedback conditions (\( F(4, 211) = 1.225, p = .301, \eta^2 = .023 \)).
Discussion

The findings of Study 2 failed to indicate that complacency is responsible for the ineffectiveness of praise feedback at increasing either participants’ pro-environmental behavioural intentions or identification with pro-environmental issues. Just as in Study 1, simple general praise did not increase any of participants’ pro-environmental inclinations above baseline levels. Even when participants received general praise alongside a message indicating that they still had considerable room for improvement, participants did not experience any increase in their motivations to behave more pro-environmentally or to identify more closely with pro-environmental issues. These findings are therefore inconsistent with the conclusion that complacency affects participants’ responses to praise with respect to these outcomes.

However, complacency did appear to have significant impact on one dimension of participants’ support for environmental preservation efforts. Praise feedback combined with an explicit indication of room for future improvement did result in greater opposition to the utilization of environmental resources than did simple praise. Participants’ support for personal conservation efforts was not similarly affected. This pattern indicated that, after receiving praise, participants may indeed become complacent in their standards of what constitutes excessive usage of environmental resources. Praise conveys the suggestion that the average person adheres to a less pro-environmental standard of behaviour than does the recipient of praise. Participants who receive praise may therefore become more inclined to believe that it is acceptable to utilize a greater quantity of environmental resources, as the average person apparently does. According to the results of Study 2, however, such complacency is only limited to one dimension of participants’ support for environmental preservation efforts and does not affect their pro-environmental behavioural intentions.
Because complacency did not account for the shortcomings of the praise messages employed in Study 1, I turned to self-determination theory (Deci & Ryan, 1987) for another plausible explanation. Research on self-determination finds that praise only serves as an effective behavioural motivator when coupled with a sense of self-determination. That is, an individual will feel inclined to perform better at a praised activity only if that individual feels autonomously responsible for the praise that he or she receives. When praise is administered in the general format employed across Studies 1 and 2, this sense of self-determination may be muted if not altogether absent. It is, after all, difficult for participants to draw clear connections between the specific behaviours that they report upon and the single, general evaluation that is received thereafter. In Study 3, I therefore set out to test whether a more behaviour-specific feedback format could increase participants’ sense of self-determination with respect to praise feedback and thereby enable praise to serve as a more effective motivator of pro-environmental behaviours and more other pro-environmental inclinations.

Study 3

In Study 1, I demonstrated that general reproach feedback leads to reductions in individuals’ pro-environmental behavioural intentions and identification with pro-environmental issues while failing to encourage increased support for environmental preservation efforts. Studies 1 and 2 also failed to find any indication that participants who received general praise feedback score above baseline on measures of pro-environmental inclinations. Study2 further indicated that complacency fails to explain the failure of praise feedback at motivating individuals to behave more pro-environmentally. In Study 3, I considered the possibility that a general message format is poorly suited to transmitting praise in a manner that effectively motivates the adoption of more pro-environmental behavioural intentions and other general pro-environmental inclinations.
General versus behaviour-specific messages

Public messaging sponsored by pro-environmental advocates typically pairs general, negative feedback with “one size fits all” suggestions on how to behave more pro-environmentally (e.g., slogans such as Reduce, Reuse, Recycle). Similarly, online pro-environmental assessment tools typically convey feedback via a single, general feedback statement that is intended to reflect the overall pro-environmental quality of individuals’ everyday behaviours (e.g., “You are living as if we had 2.56 planets to support us but we only have one;” WWF, 2009). Although such messages may successfully attract some of the public’s attention, individuals’ pro-environmental behaviours remain largely unaffected (Mazur, 2011; McKenzie-Mohr, 2000). One solution to the persuasive shortcomings of general, “one-size-fits-all” feedback is to use more behaviour-specific feedback. A behaviour-specific feedback format has been shown to succeed where general messages fail with respect to promoting healthy lifestyle choices and behaviours (Noar, Benac & Harris 2007). Like pro-environmental behaviours, health-related behaviours require effort and sacrifice to be undertaken in the present to achieve future, large-scale goals (i.e., a better quantity and quality of life in the case of health-related behaviours; a cleaner and more sustainable natural environment in the case of pro-environmental behaviours). Promoters of healthy lifestyle behaviours have succeeded at overcoming the challenge of encouraging healthy behaviours by using behaviour-specific, high-frequency feedback to frame feedback recipients’ own particular health behaviours (e.g., diet and exercise behaviours) in relation more general, long-term health goals (e.g., longer lifespan and better quality of life; Noar et al., 2007). The effectiveness of behaviour-specific feedback may be attributable to the fact that recipients of this form of feedback are led to understand that the content of each individual piece of feedback is directly contingent upon their own behaviours. Behaviour-specific feedback thereby emphasizes the role of individual message recipients’
behavioural choices in determining subsequent evaluations; regardless of whether these convey reproach, praise or a neutral assessment. General feedback only achieves this in a vague way. An individual who is asked a series of questions and then provided with a single, overall evaluation possesses no apparent means to determine exactly how his or her reported behaviours contributed to this evaluation. Recipients of behaviour-specific feedback, on the other hand, are provided with a clear sense of how their behaviours contributed to specific evaluations and, accordingly, should understand this feedback to be highly self-determined (Deci & Ryan, 1987) and thereby controllable through specific future behavioural choices. More self-determined praise feedback is known to be a particularly strong motivator of future behaviours (Deci & Ryan, 1987), suggesting that behaviour-specific praise should increase pro-environmental behavioural intentions significantly above baseline levels. Indeed, studies that have previously found praise to be an effective motivator relied on using feedback that was administered in a behaviour-specific, high-frequency fashion (Anderson et al., 1988; Eikenhou, & Austin, 2004; Lowman, 1997; Rice, Austin & Gravina, 2009). Frequent, behaviour-specific feedback therefore provides ideal conditions for praise feedback to enhance future pro-environmental behaviours.

Opportunities to convey information using behaviour-specific feedback

Behaviour-specific feedback also provides feedback recipients with richer information regarding the environmental impact of numerous everyday behaviours. This feature is particularly important when it comes to environment-related behaviours because these behaviours are rarely undertaken with exclusive concern for the environment. In fact, environment-related behaviours are usually undertaken with only secondary or even tertiary concerns for environmental outcomes. Put another way, behaviours are often categorized as environment-related on the basis of their incidental characteristics or effects. For instance, drinking water from a container is primarily aimed at the satiation of thirst but incidentally
impacts upon the environment depending on whether the container is reusable. For the large
majority of pro-environmental behaviours, pro-environmental motives must therefore compete
with other motives (e.g., power, control and consumerism; see Schwartz, 1973; Richins &
Dawson, 1992). This may help to further explain why individuals who identify themselves as
pro-environmental often nevertheless fail to engage in more pro-environmental behaviours than
individuals who do not identify themselves as such (Bragg, 1996; Mazur, 2011; McKenzie-
Mohr, 2000). Bringing the environmental consequences of everyday behaviours to the forefront
of individuals’ attention, even if briefly, should increase the likelihood that pro-environmental
motives will play a role in the decision-making process that surrounds these behaviours
(Aronson, 1999; Kreuter, Farrell, Olevitch & Brennan, 2000; Noar et al., 2007). Indeed, some
research has already found that individuals will conserve more energy if the amount of energy
consumed by their household appliances is brought to their attention on a regular, high-frequency
basis (Abrahamse, Steg, Vlek & Rothengatter, 2005; McCalley & Midden, 2002; Van
Houwelingen & Van Raaij, 1989). In each of these studies, household appliances were equipped
with feedback devices that indicated how much energy was consumed as a consequence of
participants’ daily habits. In each case, such information effectively encouraged individuals to
change their behaviours in a way that reduced energy consumption. Intervention studies in the
field of organizational behaviour management also rely on informational feedback, as praise is
only shown to effectively motivate future behaviours when used in tandem with informational
feedback that establishes clear performance standards (Crowell et al., 1988; Eikenhout & Austin,
2004; Wikoff et al., 1982). Frequent, behaviour-specific feedback that conveys information
about the environmental impact of particular behaviours should therefore increase the salience of
environmental consequences and establish clear pro-environmental performance standards,
ensuring praise feedback to be a particularly effective pro-environmental motivator. In Study 3, I
therefore set out to test the effects of behaviour-specific, high-frequency feedback on pro-environmental behavioural intentions, identification with pro-environmental issues and support for environmental preservation efforts.

Message design and predicted results

The format of feedback that was used and tested in Study 3 differed from the forms of feedback used in previous studies and, by extension, the types of feedback that are typically employed by pro-environmental advocates. The feedback used in Study 3 adopted some of the principles of tailored messaging (see Lustria, Cortese, Noar & Glueckauf, 2009; Noar et al., 2007) and organizational behaviour management interventions that have motivated behaviours through the use of praise in combination with informational feedback (see Wikoff et al., 1982; Eikenhout & Austin, 2004). Specifically, the feedback administered in Study 3 was designed to provide evaluations immediately after each response that a given participant provided with respect to a particular environment-related behaviour, making participants immediately aware of the specific connection between the particular behaviour and the evaluation received. Moreover, each participant was given information regarding the performance criteria that determined his or her evaluation. This way, each participant could understand how his or her feedback had been determined by specific behaviours. Using feedback that was particular to each of the behaviours reported by participants produced feedback that was behaviour-specific and frequent as opposed to general and one-time, as in prior studies.

I predicted that frequent, behaviour-specific feedback would succeed where general feedback had failed, particularly with respect to affecting participants’ pro-environmental behavioural intentions. I expected behaviour-specific praise feedback to increase pro-environmental behavioural intentions above baseline levels whereas behaviour-specific reproach feedback was not expected to do so. In addition, I expected that participants who received behaviour-specific
praise would be more likely to identify with pro-environmentalism and indicate more support for pro-environmentalism than would those who received behaviour-specific reproach feedback or no feedback.

Methods

Participants

Participants were 52 (23 Male, 29 Female) introductory psychology students at the University of Toronto. Participants took part in the study in exchange for course credit. Participants’ ages ranged from 18 to 32 ($M = 20; SD = 2.902$). The ethnic composition of the sample was mostly Caucasian (36%) and East Asian (35%), with the remainder of participants belonging to South Asian (8%) and various other backgrounds (e.g., Middle Eastern, Black, Aboriginal, Latin American).

Procedure

Participants took part in the study in a laboratory setting. Each participant individually completed two questionnaires administered via MediaLab. The manipulation was once more administered in the first questionnaire that participants completed. For this questionnaire, participants were asked to respond to the same 21 questions concerning everyday behaviours as in Studies 1 and 2 (e.g., “In an average week, how many times do you use a reusable bag instead of using a plastic bag?”). Unlike previous studies, however, participants received a brief feedback message following each one of their individual responses. Participants were randomly assigned to receive only one type of feedback valence following each of their 21 responses. Random assignment was to one of three feedback conditions: reproach feedback (e.g., “Ouch! For every plastic bag that you used instead of a reusable bag every week, you have added 20 pounds of plastic waste to landfills in the past year.”), praise feedback (e.g., “Good work! For every time you used a reusable bag instead of a plastic bag every week, you have prevented 20...
pounds of plastic waste from entering landfills in the past year.”) or neutral feedback (e.g., “If you use just one less plastic bag every week, you could prevent 20 pounds of plastic waste from entering landfills over the course of a year.”). The information in each piece of feedback was accurate (i.e., calculated based on statistics published by Center for Sustainable Economy, 2012; Energy.gov, 2012; WWF, 2009;), but framed to provide either praise or reproach regarding any given participant’s pro-environmental performance. A “neutral feedback” condition, which conveyed only informational feedback without any evaluation, was used for control purposes in order to isolate the effects of praise and reproach over and above the effects of informational feedback alone. Due to concerns that participants may become suspicious of the veracity of feedback that uniformly offered either praise or reproach after every single response, four questions at random intervals in the questionnaire were always followed by no feedback message. MediaLab was also programmed to provide no feedback in instances where participants’ responses would be blatantly out of line with the feedback they were assigned to receive (e.g., an individual would not be given praise feedback if he or she reported using zero reusable bags). In these instances, the computerized questionnaire simply skipped ahead to the next question. On average, this occurred less than once per administered questionnaire. Because the questionnaires were already designed not to provide feedback following some questions and because participants were specifically informed that the questionnaire would provide feedback on “some” of their responses, I did not expect that participants should become either confused or suspicious when they did not receive feedback. Indeed, the exclusion of feedback following some questionnaire items was designed to improve the believability of feedback. Participants indicated during debriefing discussions that they found the overall feedback experience to be believable and persuasive.
Next, all participants completed the same dependent measures used in previous studies (i.e., Pro-environmental behavioural intentions (Cronbach’s $\alpha = .961$); identification with pro-environmental issues (Cronbach’s $\alpha = .937$); EAI human utilization of nature subscale (Cronbach’s $\alpha = .843$); EAI personal conservation behaviour subscale (Cronbach’s $\alpha = .821$)). Participants also responded to a brief questionnaire regarding personal background and demographic characteristics. After having completed each of these measures, participants were individually probed for suspicion, debriefed then dismissed.

**Results**

**Behavioural intentions scale**

A one-way ANOVA revealed a marginally significant effect of feedback conditions on pro-environmental behavioural intentions ($F(2, 49) = 3.067, p = .056, \eta^2 = .111$). Because of strong a priori hypotheses, however, post-hoc pairwise comparisons between feedback message conditions were conducted. Using Fisher’s (1935) Least Significant Differences, comparisons revealed that participants who received behaviour-specific praise feedback scored significantly below those who received behaviour-specific reproach feedback ($p = .020, \eta^2 = .129$) and also below those who received neutral feedback, although this latter effect did not reach significance ($p = .113, \eta^2 = .091$). The behavioural intention scores of participants who received neutral (control) feedback did not differ significantly from the scores of participants who received reproach feedback ($p = .547, \eta^2 = .011$; See Table 3 for means and standard deviations). The finding that behaviour-specific praise resulted in lower pro-environmental behavioural intentions than behaviour-specific reproach was contrary to my initial hypotheses.

**Identification with pro-environmental issues**

A one-way ANOVA did not reveal a significant effect of feedback conditions on identification with pro-environmental issues ($F(2, 49) = 1.351, p = .269, \eta^2 = .052$). This finding
was also contrary to my hypothesis that behaviour-specific praise would increase scores on this measure above control levels.

Support for environmental preservation efforts

A one-way ANOVA revealed a significant effect of feedback conditions on the EAI personal conservation behaviour subscale \( F(2, 49) = 5.647, p = .006, \eta^2 = .187 \). Fisher’s (1935) Least Significant Differences test showed that participants who received behaviour-specific reproach feedback scored significantly above participants who received either behaviour-specific praise \( (p = .002, \eta^2 = .263) \) or neutral feedback \( (p = .022, \eta^2 = .135) \). A similar pattern was found with respect to the EAI human utilization of nature subscale \( F(2, 49) = 3.407, p = .041, \eta^2 = .122 \), where participants who received behaviour-specific reproach scored significantly above participants who received behaviour-specific praise \( (p = .015, \eta^2 = .173) \) or neutral feedback \( (p = .075, \eta^2 = .078) \), although the latter difference did not reach significance (See Table 3 for means and standard deviations). This pattern of findings, once again contrary to my hypotheses, indicated that participants who received behaviour-specific praise were less motivated to be pro-environmental than were participants who received behaviour-specific reproach.

Discussion

Contrary to my hypotheses, the findings of Study 3 failed to indicate that behaviour-specific praise feedback increases participants’ pro-environmental inclinations across any dependent measures. With respect to pro-environmental behavioural intentions, behaviour-specific praise did not motivate individuals to become more pro-environmental and, if anything, may have actually reduced participants’ interest in engaging in pro-environmental activities. With respect to identification with pro-environmental issues, neither behaviour-specific praise nor behaviour-specific reproach resulted in scores that differed from controls. Participants who received behaviour-specific praise also did not indicate greater support for environmental
preservation efforts. Instead, participants who received behaviours-specific reproach reported significantly greater support for environmental preservation efforts, in the form of greater support for personal conservation efforts and opposition to human utilization of the environment, than participants who received behaviour-specific praise. Rather than persuading participants to become more pro-environmental, behaviour-specific praise was found to either have no effect on pro-environmental inclinations or to reduce these inclinations. Behaviour-specific reproach feedback, on the other hand, did not fail to motivate pro-environmental inclinations across all measures, as initially hypothesized. Rather, recipients of behaviour-specific reproach scored above controls with respect to measures of support for environmental preservation efforts.

The pattern of findings uncovered by Study 3 introduces two distinct possibilities. The first possibility is that behaviour-specific praise for pro-environmental behaviours acts as a deterrent to pro-environmental inclinations. Unlike general praise, behaviour-specific praise may indeed cause participants to feel more complacent towards pro-environmental issues, preservation efforts and behaviours. A second possibility is that behaviour-specific reproach feedback, unlike general reproach feedback, actually serves to increase participants’ pro-environmental inclinations. This latter possibility is in line with findings regarding participants’ support for environmental preservation efforts. Due to the lack of a clear difference between controls and both experimental feedback conditions across all other dependent measures, it remains difficult to determine whether the significant differences between behaviour-specific praise and reproach feedback result from the former acting as a deterrent or the latter acting as a motivator.

Due to the timing of Study 3 (i.e., data were collected toward the end of a school year), I was only able to collect responses from a small sample of undergraduate participants. The feedback procedure utilized in Study 3 was also novel relative to the procedures employed by
Studies 1 and 2. It is therefore possible that the findings of Study 3 were the byproduct of either of these features and not a reliable outcome of reproach and praise feedback administered in a behaviour-specific fashion. To test whether this was the case, I next undertook a replication in Study 4.

Study 4

Because prior studies found that general feedback (Studies 1 and 2) influenced participants’ pro-environmental inclinations differently than behaviour-specific feedback (Study 3), in Study 4 I set out to directly compare both feedback formats directly against one another. Study 1 established that general reproach feedback reduces participants’ pro-environmental behavioural intentions and willingness to identify with pro-environmental issues. This finding is consistent with research indicating that individuals generally respond to reproachful evaluations and other negatively-valenced messages with avoidance and defensiveness (Fedor et al., 1989; Snyder & Newburg, 1981). The findings of Study 3, which employed behaviour-specific feedback, found a different pattern of results from studies that had employed general feedback. Praise feedback that was administered in a behaviour-specific format led to reductions in participants’ pro-environmental behavioural intentions, willingness to identify with pro-environmental issues and support for environmental preservation efforts. These findings strongly indicated that behaviour-specific feedback influences pro-environmental inclinations in a much different manner than general feedback messages. In Study 4, I set out to replicate these findings using a direct comparison of praise and reproach messages administered in each feedback format (i.e., general or behaviour-specific). Additionally, in Study 4 I tested whether participants’ dispositional regulatory focus moderated responses to praise and reproach feedback that was administered in either a general or behaviour-specific format.
Regulatory focus and hypothesized moderating effects on responses to feedback

I have argued that an individual’s dispositional regulatory focus should directly influence the way that individual understands either praise or reproach. For a promotion-focused individual whose regulatory concerns centre around gains and nongains, praise feedback that addresses pro-environmental gains in the form of achieved savings provides information that is consistent with the individual’s preferred strategy for achieving goals (i.e., pursuing successes). Similarly, a prevention-focused individual whose regulatory concerns are centred on losses and non-losses should find reproach feedback, which highlights failures to act pro-environmentally, to be more congruent with that individual’s preferred strategy for achieving goals (i.e., avoiding losses). In Studies 1 through 3, I found no evidence that praise would consistently motivate individuals to become more pro-environmental. However, it may be the case that praise increases pro-environmental inclinations only among those individuals who find this feedback to be congruent with the ways they understand and pursue their goals. That is, praise will only increase any individual’s pro-environmental inclinations, as originally predicted, insofar as the individual finds such praise feedback to be personally salient to their goals in the first place. Where praise has been shown to be an effective motivator among student athletes (Anderson et al., 1988; Feltz et al., 1999) and workplace employees (Crowell et al., 1988; Eikenhout & Austin, 2004; Lowman, 1997; Rice et al., 2009), it can be reasonably inferred that the individuals who received this praise had considered it as highly salient to their personal goals, whether these goals involved performing well (a promotion-focused goal) or simply maintaining one’s standing (a prevention-focused goal). Because environmental concerns do not play the same central role in people’s lives as workplace performance, praise feedback concerning the incidental, environmental impact of everyday behaviours should be less personally salient than the praise that is employed in the aforementioned studies.
For individuals who are more chronically promotion-focused, however, praise feedback concerning environment-related behaviours may be more salient, as such feedback is highly congruent with the sorts of strategies such individuals adopt to pursue personal goals. Accordingly, a more promotion-focused disposition should correspond with greater pro-environmental inclinations following praise. More prevention-focused individuals, on the other hand, should find that reproach feedback is more congruent with their typical goal-pursuit strategies. A more prevention-focused individual will therefore find reproach feedback to be more congruent with their personal goal-seeking approach. As argued at the outset, however, reproach feedback is not expected to increase individuals’ pro-environmental inclinations, regardless of how salient such feedback may be to the individual who receives it. This is based on evidence that finds reproach feedback to have a negative effect on individuals’ perceived competence and desire to engage in a task (Vallerand et al., 1986; Vallerand & Reid, 1984, 1988). If anything, reproach feedback that is more salient should enhance these negative effects rather than serving any positive motivational function. Therefore, I predicted that only greater levels of dispositional promotion focus would result in greater pro-environmental inclinations, particularly following praise feedback. In Study 4, I set out to test whether promotion focus would be associated with greater pro-environmental motivation after praise feedback, and also whether this effect would hold for both behaviour-specific and general forms of feedback.

Hypotheses

I predicted that, consistent with Study 1, general reproach feedback would result in lower identification with pro-environmental issues than all other feedback types. Additionally, I examined whether, consistent with Study 3, behaviour-specific praise feedback would result in lower pro-environmental inclinations than other feedback conditions. Finally, I predicted that more promotion-focused individuals would respond more pro-environmentally than prevention-
focused individuals following behaviour-specific praise as opposed to behaviour-specific reproach feedback.

Methods

Participants

Participants were 150 (51 Male, 99 Female) English-speaking residents of the United States recruited via Amazon Mechanical Turk. Participants took part in the study in exchange for a small payment. Participants’ age ranged from 18 to 57 \((M = 30.24; SD = 7.684)\). The ethnic composition of the sample was primarily Caucasian (78.2%), with the remainder of participants divided evenly across Black American, Latin American and various Asian backgrounds.

Procedure

Individuals registered as “Workers” on Amazon Mechanical Turk were recruited to complete an “Environmental Behaviour Questionnaire.” Only those workers who had not completed our prior studies via Mechanical Turk were eligible to participate. Mechanical Turk Worker identification numbers were used to disqualify any repeat participants. Participants were each first asked to complete the General Regulatory Focus Measure (Lockwood et al., 2002). This measure consists of items from two subscales. The first subscale composes 9 items designed to measure participants’ dispositional levels of promotion-focused motivation (e.g., “I often think about the person I would ideally like to be in the future.”; Cronbach’s \(\alpha = .895\)) and the second entails 9 items designed to measure dispositional levels of prevention-focused motivation (e.g., “I am anxious that I will fall short of my responsibilities and obligations.”; Cronbach’s \(\alpha = .785\); Lockwood et al., 2002). Participants rated their agreement with each of 18 items using a Likert Scale ranging from 1 (not at all true of me) to 9 (very true of me).

Following the criteria set forth in Study 1, four participants over the age of 60 were excluded from analyses.
Participants were then asked to answer the same 21 questions as used in Studies 1 through 3, reporting on the quantity and frequency of various everyday pro-environmental behaviours. Participants were randomly assigned to receive one of four types of feedback, or to a control condition. The four feedback types were: general praise, general reproach, behaviour-specific praise, and behaviour-specific reproach. Participants who received general feedback read a single evaluative passage following submission of all 21 responses, as in Studies 1 and 2. Participants who received behaviour-specific feedback read an evaluative message following each of their 21 responses (with some exceptions made in order to reduce participant suspicions, as in Study 3). Participants in the control condition received no feedback message, but were simply instructed to proceed to the next task.

Next, all participants completed a questionnaire consisting of the same dependent measures used in prior studies (i.e., Pro-environmental behavioural intentions (Cronbach’s α = .955); Identification with pro-environmental issues (Cronbach’s α = .927); EAI human utilization of nature subscale (Cronbach’s α = .872); EAI personal conservation behaviour subscale (Cronbach’s α = .818). Participants also responded to a brief questionnaire regarding personal background and demographic characteristics. Following this, each participant was provided with a debriefing package that included an explanation of the purpose of this study.

Results

Behavioural intentions scale

A 2x2 ANOVA revealed a significant feedback valence by feedback format interaction for participants’ pro-environmental behavioural intentions ($F(1, 144) = 6.871, p = .010, \eta^2 = .052$). The main effects of feedback valence (i.e., praise or reproach; $F(1, 144) = 1.772, p = .186, \eta^2 = .013$) and feedback format (i.e., general or behaviour-specific; $F(1, 144) = .989, p = .322, \eta^2 = .007$) were not significant. Fisher’s (1935) protected pairwise comparisons between conditions
found that individuals who received behaviour-specific praise had significantly lower pro-environmental behavioural intentions than did participants who received either behaviour-specific reproach ($p = .008, \eta^2 = .124$) or general praise ($p = .014, \eta^2 = .124$), but not participants in the control condition ($p = .055, \eta^2 = .075$). When comparing five means, however, a pairwise alpha-level of .01 is needed to maintain a familywise error of .05 (Hayter, 1986). The difference between general praise and behaviour-specific praise should therefore be considered with caution. Nevertheless, the finding that this difference has an effect size that is nearly identical to the effect size of the difference between behaviour-specific reproach and behaviour-specific praise suggests that both differences ought to be considered meaningful. Participants who received general praise also did not significantly differ on this measure from those who received general reproach ($p = .347, \eta^2 = .019$) or controls ($p = .775, \eta^2 = .010$; See Table 4 for means and standard deviations). This finding is consistent with those of prior studies to the extent that it indicates that general messages had little effect on pro-environmental behavioural intentions whereas behaviour-specific praise feedback reduced these intentions relative to behaviour-specific reproach.

**Identification with pro-environmental issues**

A 2x2 ANOVA revealed a significant feedback valence by feedback format interaction for participants’ identification with pro-environmental issues ($F(1, 144) = 7.326, p = .008, \eta^2 = .049$). Neither the main effect of feedback valence ($F(1, 144) = .643, p = .424, \eta^2 = .004$) nor the main effect of feedback format ($F(1, 144) = .127, p = .722, \eta^2 = .001$) were significant. Pairwise comparisons between conditions showed that individuals who received general praise identified more with pro-environmental issues than participants who received general reproach ($p = .014, \eta^2 = .087$), but did not differ from controls ($p = .156, \eta^2 = .038$). Using a stricter alpha-level to account for familywise error (Hayter, 1986), however, this difference can only be considered
marginally significant. Participants who received behaviour-specific praise did not significantly differ on this measure from those who received general praise ($p = .034, \eta^2 = .072$), behaviour-specific reproach ($p = .184, \eta^2 = .031$) or controls ($p = .413, \eta^2 = .014$; See Table 4 for means and standard deviations). As in Study 1, participants who received general reproach were less identified with pro-environmental issues than those who received general praise feedback. Because the key contrast was marginally significant, however, this finding should be interpreted with caution.

Support for environmental preservation efforts

A 2x2 ANOVA revealed a significant feedback valence by feedback format interaction for participants’ scores on the EAI human utilization of nature subscale ($F(1, 144) = 9.882, p = .002, \eta^2 = .065$), but no significant main effects for either feedback valence ($F(1, 144) = 3.073, p = .082, \eta^2 = .020$) or for feedback format ($F(1, 144) = .410, p = .523, \eta^2 = .003$). Participants who received behaviour-specific praise feedback scored significantly below participants who received behaviour-specific reproach ($p = .001, \eta^2 = .156$) or general praise ($p = .010, \eta^2 = .096$) and non-significantly below participants who received general reproach ($p = .094, \eta^2 = .056$) or controls ($p = .017, \eta^2 = .079$; See Table 4 for means and standard deviations).

2x2 ANOVA did not reveal a significant feedback by valence interaction for participants’ scores on the EAI personal conservation behaviour subscale ($F(1, 144) = 1.159, p = .283, \eta^2 = .008$). Neither the main effects of feedback valence ($F(1, 144) = .222, p = .638, \eta^2 = .002$) nor of feedback format ($F(1, 144) = .349, p = .555, \eta^2 = .002$) were significant.

Interactions with Regulatory Focus

I next tested whether participants’ dispositional levels of prevention- and promotion-focused motivational orientation would interact with the valence of feedback messages to
influence participants’ scores on dependent measures of pro-environmental inclinations. To examine this possibility, I carried out three-level hierarchical regression analyses for each dependent measure (Baron & Kenny, 1986; Holmbeck, 1997). One dummy vector was created to represent feedback valence (praise or reproach) and one to represent feedback format (general or behaviour-specific). The two-way interactions between dummy vectors and each form of dispositional regulatory focus were examined at the second level of the analyses. At the third level of these analyses, the interaction of dummy vectors with each other and with dispositional regulatory focus was examined. Because the no-feedback condition constituted a “hanging” control group that was not crossed with the other conditions, this condition was excluded from the regression analysis but used in post-hoc comparisons of slope magnitude.

Dispositiona]ional Prevention focus

Pro-environmental behavioural intentions. I first regressed pro-environmental behavioural intentions on prevention focus, feedback valence, and feedback format. Regression analyses revealed an unexpected but significant prevention focus by feedback valence by feedback format three-way interaction ($\Delta F(1, 100) = 6.093, p = .016, \eta^2 = .136$). A decomposition of this 3-way interaction did not reveal a significant interaction of feedback valence and prevention focus among participants who received behaviour-specific feedback ($\Delta F(1, 47) = 0.843, p = .364, \eta^2 = .017$) but did reveal a significant interaction of feedback valence and prevention focus among participants who received general feedback ($\Delta F(1, 50) = 7.430, p = .009, \eta^2 = .124$). An analysis of simple effects revealed a significant positive correlation between prevention-focused motivations and pro-environmental behavioural intentions among participants who received general reproach feedback ($r(24) = .392, p = .048$), but not those who received general praise ($r(24) = -.294, p = .146$). That is, participants with a stronger prevention focus were more likely to indicate intentions to behave pro-environmentally after receiving a
general message of reproach but not a general message of praise. There was also, however, a positive correlation among participants who received behaviour-specific praise ($r(18) = .473, p = .035$), but not those who received behaviour-specific reproach ($r(19) = .117, p = .612$) or controls ($r(25) = .013, p = .947$).

**Identification with pro-environmental issues.** I next regressed identification with pro-environmental issues on prevention focus, feedback valence, and feedback format. Analyses failed to find a significant three-way interaction effect ($\Delta F(1, 100) = 1.382, p = .243, \eta^2 = .079$) nor a significant two-way interaction of prevention focus and feedback format ($\Delta F(1, 103) = .968, p = .328, \eta^2 = .009$) or prevention focus and feedback valence ($\Delta F(1, 103) = .003, p = .954, \eta^2 < .001$).

**Support for environmental preservation efforts.** I then regressed scores on the EAI human utilization of nature subscale on prevention focus, feedback valence, and feedback format. Analyses did not reveal a significant three-way interaction ($\Delta F(1, 100) = .432, p = .512, \eta^2 = .115$). Analyses did reveal a marginally significant interaction effect of prevention focus and feedback format ($\Delta F(1, 103) = 3.368, p = .070, \eta^2 = .003$), but no significant effect of the interaction of prevention focus and feedback valence ($\Delta F(1, 103) = .597, p = .442, \eta^2 = .006$). When EAI personal conservation behaviour subscale scores were regressed on prevention focus, feedback valence, and feedback format, a similar pattern was found. That is, analyses failed to find a significant three-way interaction ($\Delta F(1, 100) = 2.435, p = .122, \eta^2 = .073$). Analyses did reveal a significant interaction effect of prevention focus and feedback format ($\Delta F(1, 103) = 4.249, p = .042, \eta^2 = .039$), but no significant effect of the interaction of prevention focus and feedback valence ($\Delta F(1, 103) = .525, p = .470, \eta^2 = .005$). Due to the similarity in the pattern of findings for both of these dependent variables, a simple effects analysis was carried out to
examine the interaction effect of prevention focus and feedback format. For the EAI human utilization of nature subscale, simple effects analyses revealed a positive, non-significant correlation between scores and prevention focus among those who received behaviour-specific feedback ($r(52) = .233, p = .112$) but not among those who received general feedback ($r(66) = .007, p = .953$) or among controls ($r(31) = .029, p = .872$). For the EAI personal conservation behaviour subscale, simple effects analyses revealed a positive, non-significant correlation between scores and prevention focus among those who received behaviour-specific feedback ($r(52) = .172, p = .214$) and controls ($r(31) = .198, p = .270$), but showed a negative non-significant correlation among those who received general feedback ($r(66) = -.147, p = .233$). Neither of these findings were consistent with my original predictions. However, both findings are consistent in showing that greater prevention focus is associated with stronger pro-environmental inclinations among participants who receive behaviour-specific feedback and not among those who receive general feedback, regardless of feedback valence. Given that I had not expected prevention focus to influence responses to any of the forms of feedback, and given that responses to behaviour-specific feedback were inconsistent with those for the general feedback format, I did not draw conclusions regarding the role of prevention focus in response to environment-related feedback.

Dispositional Promotion focus

Pro-environmental behavioural intentions. I regressed pro-environmental behavioural intentions on promotion focus, feedback valence, and feedback format. Analyses did not reveal a significant three-way interaction ($\Delta F(1, 100) = 2.026, p = .158, \eta^2 = .056$). Analyses did reveal a significant interaction effect of promotion focus and feedback format ($\Delta F(1, 103) = 4.834, p = .031, \eta^2 = .029$), but no significant effect of the interaction of promotion focus and feedback valence ($\Delta F(1, 103) = 1.074, p = .303, \eta^2 = .007$). A simple effects analysis showed that
promotion focus was positively correlated with pro-environmental behavioural intentions across feedback conditions; this correlation was strongest among those who received general feedback ($r(31) = .715, p < .001$) followed by controls ($r(66) = .690, p < .001$) and those who received behaviour-specific feedback recipients ($r(52) = .625, p < .001$). This finding is therefore relatively uninformative with respect to differentiating participants on the basis of the feedback they received.

Identification with pro-environmental issues. I regressed identification with pro-environmental issues on promotion focus, feedback valence, and feedback format. Analyses failed to detect a significant three-way interaction ($\Delta F(1, 100) = 2.135, p = .147, \eta^2 = .041$). Analyses also failed to detect significant interactions of promotion focus and feedback format ($\Delta F(1, 103) = 2.095, p = .151, \eta^2 = .013$) or promotion focus and feedback valence ($\Delta F(1, 103) = .683, p = .411, \eta^2 = .004$).

Support for environmental preservation efforts. A similar pattern of null findings was uncovered with respect to EAI human utilization of nature subscale scores (three-way interaction: $\Delta F(1, 100) = 3.486, p = .065, \eta^2 = .084$; promotion focus by feedback format: $\Delta F(1, 103) = .158, p = .692, \eta^2 = .001$; promotion focus by feedback valence: $\Delta F(1, 103) = 2.133, p = .147, \eta^2 = .016$) and EAI personal conservation behaviour subscale scores (three-way interaction: $\Delta F(1, 100) = .933, p = .336, \eta^2 = .014$; promotion focus by feedback format: $\Delta F(1, 103) = .243, p = .623, \eta^2 = .002$; promotion focus by feedback valence: $\Delta F(1, 103) = .329, p = .568, \eta^2 = .003$).

These findings fail to support my prediction that more promotion-focused individuals would respond more pro-environmentally after receiving praise feedback.
Discussion

The results of Study 4 revealed differences between general and behaviour-specific feedback that partially confirmed the distinct effects of each feedback format as suggested by the findings of Studies 1 through 3. With respect to the moderating effect of participants’ dispositional regulatory focus on responses to feedback, however, the results of Study 4 failed to support my initial predictions.

General versus behaviour-specific feedback

As in previous studies, the findings of Study 4 indicated that praise feedback resulted in lower pro-environmental behavioural intentions than reproach feedback only when feedback was conveyed using a behaviour-specific, not general, format. The findings of Study 4 were also consistent with the findings of Study 1, which showed that reproach feedback reduced identification with pro-environmental issues relative to praise feedback when reproach was conveyed in a general, not behaviour-specific, format. I note that although overall group differences on this measure were found to be highly significant and the scores of participants who received general praise did exceed the scores of participants who received general reproach feedback, the mean difference between these feedback groups was only marginally significant. This finding must therefore be interpreted with caution. As in Studies 1 and 2, Study 4 indicated that neither general praise nor general reproach increased participants’ pro-environmental inclinations above baseline levels. Similarly, Study 4 failed to find above-baseline pro-environmental inclinations following behaviour-specific praise or reproach.

The results of Study 4 further indicated that only participants’ opposition to the usage of environmental resources for personal benefit declined following behaviour-specific praise whereas support for personal conservation efforts remained unchanged. In other words, participants who received behaviour-specific praise felt just as supportive of daily conservation
efforts as others, but believed that they were entitled to consume more in comparison with other participants. This pattern is consistent with the interpretation that participants respond with complacency after experiencing behaviour-specific praise feedback. Having performed well, according to the feedback they receive, these participants may feel entitled to relax their standards of what constitutes excessive consumption. The findings of Study 4 demonstrated that this pattern applies only to participants who receive behaviour-specific feedback and not those who receive general feedback messages. In other words, it appears that a sense of entitlement to use environmental resources, alongside lower pro-environmental behavioural intentions, results uniquely from behaviour-specific praise and not from general praise.

Overall, the results of Study 4 indicated that when praise and reproach feedback do have an impact on participants’ pro-environmental inclinations, the nature of that impact depends upon whether feedback is administered in a general or a behaviour-specific format. When feedback is administered in a behaviour-specific fashion, praise appears to reduce individuals’ pro-environmental behavioural intentions while increasing participants’ sense of entitlement to use environmental resources. When feedback is administered in a general fashion, there is some evidence suggesting that reproach feedback reduces individuals’ inclinations to identify with pro-environmental issues.

*Moderating effects of regulatory focus*

In accordance with my original predictions, participants’ dispositional levels of prevention focus did not significantly moderate pro-environmental outcomes following feedback, with one exception: Unexpectedly, higher levels of prevention focus were associated with greater pro-environmental behavioural intentions following general reproach feedback.

Analyses that examined how dispositional promotion focus moderated the effects of feedback valence on pro-environmental inclinations failed to support my initial predictions. I
found no evidence that more promotion-focused participants were more pro-environmentally motivated following praise feedback for any of the dependent measures.

**Study 5**

The findings of Study 4 indicated that general and behaviour-specific praise and reproach feedback affect participants’ pro-environmental inclinations differently, but failed to provide consistent evidence that participants’ dispositional regulatory focus moderated responses to praise or reproach delivered through either of these formats. Specifically, Study 4 failed to show that praise feedback was more effective at motivating the pro-environmental inclinations of more dispositionally promotion-focused individuals. Accordingly, it may be that promotion focus does not moderate individuals’ responses to feedback concerning environment-related behaviours. On the other hand, it may be the case that even highly promotion-focused individuals have difficulty understanding typical environment-related feedback in relation to their promotion-focused goals.

Popular media typically frame environment-related information in prevention-focused terms that emphasize waste reduction (e.g., Fox et al., 2007; Miller & Bates, 2010; Pearlstein, 2008) and impending disaster (e.g., Greenpeace, 2012; Lefurgey-Smith et al., 2012). This loss-framing may well be inconsistent with a promotion-focused concern with gains and nongains. It may be that more promotion-focused participants will respond more pro-environmentally to praise feedback only if such feedback is conveyed in terms of gains/nongains rather than losses/nonlosses (Shah & Higgins, 2001).

**Regulatory focus context**

In Study 5, I examined the possibility that regulatory focus might interact with the framing of pro-environmental feedback in terms of gains or losses. Environmental information is typically conveyed in a context that might be most appealing to prevention-focused individuals with a focus on losses such as the degradation of natural resources and the accumulation of
hazardous waste. It may be possible to make environmental feedback more appealing to promotion-focused individuals by framing the feedback in terms of gains (or nongains); that is, feedback can be conveyed to emphasize accumulated savings and improved environmental conditions. This possibility is consistent with past research examining the impact of regulatory focus following social comparisons (Lockwood et al., 2002). In one study, for example, individuals with a promotion focus were more motivated by the example set by a high-achiever, someone who exemplified the gains that promotion-focused individuals hoped to achieve. Individuals with a prevention focus were more motivated by the example set by a low-achiever, someone who exemplified the losses that prevention-focused individuals aimed to avoid. Individuals were most motivated when the social comparison target represented a strategy that was congruent with the strategy favoured by the individual. Other studies have found a similar pattern of results. For instance, instructions for solving an anagram puzzle were more motivating when the framing of these messages was congruent with individuals’ regulatory focus ( Förster, Higgins & Idson, 1998; Shah, Higgins & Friedman, 1998). Persuasive messages encouraging participation in sports were similarly motivating when framed congruently to individuals’ regulatory focus (Semin, Higgins, de Montes, Estourget & Valencia, 2005). These findings consistently indicate that the motivational impact of information and persuasive messages is increased when these messages are framed in a fashion that is congruent with individuals’ preferred strategies for goal pursuit.

In Study 4, I found that, contrary to my predictions, promotion-focused individuals were no more likely to be motivated by praise feedback than were prevention-focused individuals. That study, however, compared responses to praise feedback that primarily dealt with success in avoiding environmental losses, a message-framing that may be more consistent with the goals of prevention-focused individuals.
Hypotheses and feedback design

In Study 5, I examined whether promotion-focused individuals would be more responsive to praise feedback when that feedback was framed in terms of gains/nongains rather than losses/nonlosses. For example, promotion-focused individuals might be more motivated by feedback indicating that they had successfully achieved improvements in air quality (a gain) than by feedback indicating that they had successfully avoided higher levels of pollution (a nonloss). For the purposes of comparison, I also tested how praise and reproach framed in terms of gains/nongains or losses/nonlosses would affect participants with higher levels of prevention focus. Though prior studies (e.g., Lockwood et al., 2002) indicate that more prevention-focused individuals may be more motivated by concerns for future losses, this was not expected to translate into increased pro-environmental responses among more prevention-focused individuals who received any form of prevention-focused feedback. This is because prevention-focused individuals should not find praise to be salient to their chronic goals, and because reproach feedback should be a poor source of motivation for anyone who encounters it, as discussed above (see Vallerand et al., 1986; Vallerand & Reid, 1984, 1988), regardless of dispositional levels of prevention focus. In sum, I predicted that praise feedback would be most effective in motivating pro-environmental behavioural change, but only for promotion-focused individuals and only when the feedback was framed in terms of gains achieved rather than losses avoided.

In Study 5, I designed feedback to convey either a gain or loss frame by using procedures set out by Brendl, Higgins and Lemm (1995). That is, I used otherwise identical feedback that was worded in terms of either gains and nongains or losses and nonlosses, respectively. To deliver feedback to participants, I used behaviour-specific feedback in Study 5. Studies 1, 2 and 4 indicated that feedback delivered in a general format holds little promise for increasing participants’ pro-environmental inclinations above baseline levels. Behaviour-specific feedback,
on the other hand, consistently influenced participants’ pro-environmental behavioural intentions across Studies 3 and 4, though not in a manner that was consistent with my original predictions. Some evidence from Study 4 indicated that complacency following behaviour-specific praise may be the reason for this. Praise that is framed in terms of gains, however, may help overcome such complacent responses by setting the stage for participants to apply their promotion-focused motivation to environment-related behaviours and concerns, particularly when those individuals possess greater dispositional promotion-focused motivation. Hence, I predicted that dispositionally promotion-focused individuals would become more pro-environmental following praise feedback, but only if such feedback were framed in terms of gains/nongains.

Methods

Participants

Participants were 139 (68 Male, 70 Female, 1 not reported) introductory psychology students at the University of Toronto. Participants took part in the study in exchange for course credit. Participants’ ages ranged from 18 to 40 (M = 19.48; SD = 2.74). The ethnic composition of the sample was primarily East Asian (44.1%) and Caucasian (34.8%) with the remainder of participants belonging to South Asian (7.9%) and various other backgrounds.

Procedure

Participants signed up online to complete an experiment in social psychology. The experiment took place in a laboratory and all questionnaires were administered via MediaLab (Empirisoft, 2011). Each participant first completed a measure of regulatory focus (Lockwood et al., 2002) to assess levels of dispositional promotion focus (Cronbach’s α = .858) and prevention focus (Cronbach’s α = .827). Participants were then asked to complete the independent manipulation which, as in prior studies, entailed a 21-item questionnaire concerning everyday environment-related behaviours. Following each of their 21 responses, participants received a
brief, behaviour-specific feedback message (with some exceptions made in order to reduce participant suspicions; following the same procedures as Study 3).

Each participant was randomly assigned to one of four feedback conditions (praise/gain, praise/loss, reproach/gain, reproach/loss) or to a baseline control condition in which no feedback messages were received. Participants in the praise-gain condition received feedback that provided a pat on the back for the environmental gains they had achieved (e.g., “Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to plastics. This helps to achieve a cleaner environment.”), whereas those in the praise/loss condition received feedback giving them a pat on the back for the environmental losses they had avoided (e.g., “Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of plastics. This prevents unnecessary waste from adding to the swell of landfills.”). Participants in the reproach/gain condition received feedback giving them a slap on the wrist for the environmental gains they had failed to achieve (e.g., “Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to plastics. This falls short of what is necessary to achieve a cleaner environment.”), whereas those in the reproach/loss received feedback slapping them on the wrist for the environmental losses they had incurred (e.g., “Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of plastics. This allows unnecessary waste to add to the swell of landfills.”).

Next, participants were asked to complete a questionnaire consisting of the same dependent measures as in previous studies (i.e., Pro-environmental behavioural intentions (Cronbach’s α = .963); Identification with pro-environmental issues (Cronbach’s α = .939); EAI human utilization of nature subscale (Cronbach’s α = .845); EAI personal conservation behaviour subscale (Cronbach’s α = .847)). Participants also responded to a brief questionnaire
regarding personal background and demographic characteristics. After having completed these measures, participants were individually probed for suspicion, debriefed then dismissed.

Results

**Behavioural intentions scale**

A 2x2 ANOVA revealed no significant valence (praise or reproach) by framing (gain-framed or loss-framed) interaction ($F(1, 100) = .104, p = .748, \eta^2 = .001$) effect on pro-environmental behavioural intentions. There was also no significant main effect of feedback valence (i.e., praise or reproach; $F(1, 100) = .568, p = .453, \eta^2 = .005$) on this measure. However, analyses did reveal a significant main effect of feedback framing (i.e., gain-framed or loss-framed; $F(1, 100) = 11.023, p = .001, \eta^2 = .099$). Fisher’s (1935) protected pairwise comparisons indicated that participants who received any feedback framed in loss-framed terms had significantly lower ($p = .001, \eta^2 = .098$) pro-environmental behavioural intentions than participants who received feedback messages framed in gain-framed terms, regardless of whether the feedback involved praise or reproach. For comparison, the scores of participants in the baseline control condition were included in these pairwise comparisons and did not significantly differ from the scores of participants who received feedback in either loss-framed ($p = .105, \eta^2 = .029$) or gain-framed terms ($p = .171, \eta^2 = .023$; See Table 5 for all condition means and standard deviations).

**Identification with pro-environmental issues**

A 2x2 ANOVA failed to detect a significant valence by framing interaction effect on participants’ identification with pro-environmental issues ($F(1, 100) = 1.649, p = .202, \eta^2 = .015$). These analyses also failed to reveal a main effect of feedback framing ($F(1, 100) = 1.724, p = .192, \eta^2 = .016$). However, analyses did reveal a significant main effect of feedback valence
Pairwise comparisons indicated that praise recipients had greater scores than reproach recipients on this measure, at a marginal level of significance ($p = .057, \eta^2 = .035$). When compared against scores of participants in the baseline control condition, neither praise ($p = .099, \eta^2 = .026$) nor reproach ($p = .979, \eta^2 < .001$; See Table 5 for all condition means and standard deviations) recipients’ scores significantly differed from the scores of these participants.

**Support for environmental preservation efforts**

A 2x2 ANOVA failed to reveal a significant valence by framing interaction effect on participants’ scores on the EAI human utilization of nature subscale ($F(1, 100) = 1.936, p = .167, \eta^2 = .017$). Analyses also revealed no main effect of feedback valence ($F(1, 100) = 3.318, p = .072, \eta^2 = .029$) but analyses did reveal a significant main effect of feedback framing ($F(1, 100) = 7.857, p = .006, \eta^2 = .070$). Pairwise comparisons indicated that participants who received loss-framed feedback scored significantly below those who received gain-framed feedback ($p = .002, \eta^2 = .069$), regardless of feedback valence. That is, participants who received feedback framed as losses incurred or avoided were more likely to favour the utilization of environmental resources for personal benefit. For comparison, the scores of participants in the baseline control condition did not significantly differ from those of participants who received either loss-framed ($p = .066, \eta^2 = .042$) or gain-framed ($p = .371, \eta^2 = .008$; See Table 5 for all condition means and standard deviations) feedback.

With respect to the EAI personal conservation behaviour subscale, a 2x2 ANOVA revealed no significant valence by framing ($F(1, 100) = .692, p = .407, \eta^2 = .006$) interaction. Analyses also failed to reveal a significant main effect of feedback valence ($F(1, 100) = 2.788, p = .098, \eta^2 = .026$) but did reveal a significant main effect of feedback framing upon participants’
scores on this measure \( F(1, 100) = 6.009, p = .016, \eta^2 = .055 \). Pairwise comparisons once more indicated that participants who received loss-framed feedback scored significantly below those who received gain-framed feedback \( p = .015; \eta^2 = .054 \), regardless of feedback valence. That is, participants who received feedback framed as losses incurred or avoided were less likely to favour efforts to conserve environmental resources. The scores of participants in the baseline control condition did not significantly differ from those of participants who received either loss-framed \( p = .169; \eta^2 = .024 \) or gain-framed feedback \( p = .472; \eta^2 = .006 \); See Table 5 for all condition means and standard deviations).

**Interactions with Regulatory Focus**

To determine whether participants’ dispositional prevention- or promotion focus predicted their pro-environmental inclinations following each distinct form of feedback used in this study, a three-level hierarchical regression analysis was carried out for each dependent measure of pro-environmental inclinations. One dummy vector was created to represent feedback valence (praise or reproach) and one to represent feedback framing (gain-framed or loss-framed). The two-way interactions between dummy vectors and each form of dispositional regulatory focus were examined at the second level of the analyses. At the third level of these analyses, the interaction of dummy vectors with each other and with dispositional regulatory focus was examined. As the no-feedback condition constituted a “hanging” control group that was not crossed with the other conditions, this condition was excluded from the regression analysis but used in post-hoc comparisons of slope magnitude.

*Dispositional prevention focus*

*Pro-environmental behavioural intentions.* I first regressed pro-environmental behavioural intentions on prevention focus, feedback valence, and feedback framing. The analysis revealed a significant 3-way interaction \( \Delta F(1, 97) = 9.078, p = .003, \eta^2 = .073 \). A
decomposition of this 3-way interaction revealed a significant interaction of feedback framing and prevention focus among participants who received praise ($\Delta F(1, 47) = 6.415, p = .015, \eta^2 = .104$) but not among those who received reproach feedback ($\Delta F(1, 49) = 2.389, p = .129, \eta^2 = .039$). Specifically, there was a significant positive bivariate relationship between pro-environmental behavioural intentions and dispositional prevention focus only for participants who received loss-framed praise feedback ($r(24) = .630, p = .001$) and not for those who received gain-framed praise ($r(24) = -.124, p = .546$). There was no such significant bivariate relationship for participants who received gain-framed reproach ($r(27) = .353, p = .061$), loss-framed reproach ($r(25) = -.079, p = .694$) or no feedback at all ($r(29) = .185, p = .318$). As can be seen in Figures 1 and 2, participants who received loss-framed praise feedback consistently scored below participants in other conditions at all but the highest levels of dispositional prevention focus.

Identification with pro-environmental issues. I regressed identification with pro-environmental issues on prevention focus, feedback valence, and feedback framing. Analyses detected a significant 3-way interaction ($\Delta F(1, 97) = 4.518, p = .036, \eta^2 = .040$). A decomposition of this 3-way interaction revealed a marginally significant interaction of feedback framing and prevention focus among participants who received praise ($\Delta F(1, 47) = 3.659, p = .062, \eta^2 = .067$) but not among those who received reproach feedback ($\Delta F(1, 49) = 1.035, p = .314, \eta^2 = .019$). There was a significant positive bivariate relationship between identification with pro-environmental issues and dispositional prevention focus only for participants who received loss-framed praise ($r(24) = .609, p = .001$) but not for those who received gain-framed praise ($r(24) = -.046, p = .823$). No significant bivariate relationship existed for those who received gain-framed reproach ($r(27) = .112, p = .564$), loss-framed reproach ($r(25) = -.156, p = .439$), or no feedback ($r(29) = -.017, p = .927$). As can be seen in Figures 3 and 4, recipients of
loss-framed praise feedback consistently scored lower than those in other conditions at lower levels of dispositional prevention-focused motivation.

Support for environmental preservation efforts. I regressed scores on the EAI human utilization of nature subscale on prevention focus, feedback valence, and feedback framing. Analyses detected a significant 3-way interaction \( \Delta F(1, 97) = 8.700, p = .004, \eta^2 = .073 \). A decomposition of this 3-way interaction revealed a marginally significant interaction of feedback framing and prevention focus among participants who received praise \( \Delta F(1, 47) = 3.719, p = .060, \eta^2 = .071 \) and a significant interaction among participants who received reproach feedback \( \Delta F(1, 49) = 5.355, p = .025, \eta^2 = .082 \). There was a significant positive bivariate relationship between scores on this measure and prevention focus only for participants who received loss-framed praise feedback \( r(24) = .461, p = .018 \) but not for those who received gain-framed praise \( r(24) = -.187, p = .361 \). For participants who received gain-framed reproach, prevention focus and scores on this measure were positively correlated \( r(27) = .227, p = .237 \); For those who received loss-framed reproach, prevention focus and scores on this measure were negatively correlated \( r(25) = -.353, p = .071 \). For participants who received no feedback, there was no significant bivariate relation \( r(29) = -.153, p = .410 \). As can be seen in Figures 5 and 6, recipients of loss-framed praise scored below those in other conditions at lower and moderate levels of dispositional prevention focus.

I next regressed scores on the EAI personal conservation behaviour subscale on prevention focus, feedback valence, and feedback framing. This analysis found no significant 3-way \( \Delta F(1, 97) = 1.976, p = .163, \eta^2 = .018 \) interaction effect. Analyses also failed to find a significant effect of the interaction of prevention focus and feedback valence \( \Delta F(1, 99) = 1.848, p = .177, \eta^2 = .017 \), and the interaction of prevention focus and feedback framing \( \Delta F(1, 99) = .783, p = .378, \eta^2 = .007 \).
Dispositional Promotion focus

Pro-environmental behavioural intentions. I first regressed pro-environmental behavioural intentions on promotion focus, feedback valence, and feedback framing. This analysis found no significant 3-way ($\Delta F(1, 97) = 1.276, p = .262, \eta^2 = .007$) interaction effect. Analyses also failed to find a significant effect of the interaction of promotion focus and feedback valence ($\Delta F(1, 99) = .820, p = .367, \eta^2 = .007$), and the interaction of promotion focus and feedback framing ($\Delta F(1, 99) = .002, p = .967, \eta^2 < .001$).

Identification with pro-environmental issues. I then regressed identification with pro-environmental issues on promotion focus, feedback valence, and feedback framing. This analysis found no significant 3-way ($\Delta F(1, 97) = .013, p = .909, \eta^2 < .001$) interaction effect. Analyses also failed to find a significant effect of the interaction of promotion focus and feedback valence ($\Delta F(1, 99) = .657, p = .420, \eta^2 = .006$), and the interaction of promotion focus and feedback framing ($\Delta F(1, 99) = .256, p = .614, \eta^2 = .002$).

Support for environmental preservation efforts. I next regressed scores on the EAI human utilization of nature subscale on promotion focus, feedback valence, and feedback framing. This analysis found no significant 3-way ($\Delta F(1, 97) = 1.095, p = .298, \eta^2 = .003$) interaction effect. Analyses also failed to find a significant effect of the interaction of promotion focus and feedback valence ($\Delta F(1, 99) = .099, p = .753, \eta^2 < .001$), and the interaction of promotion focus and feedback framing ($\Delta F(1, 99) = .058, p = .809, \eta^2 < .001$).

A similar analysis failed to find a significant 3-way or 2-way interaction effect on participants’ scores on the EAI personal conservation behaviour subscale (3-way: $\Delta F(1, 97) = 1.191, p = .278, \eta^2 = .021$; promotion focus by feedback valence $\Delta F(1, 99) = .669, p = .415, \eta^2 = .006$; promotion focus by feedback framing: $\Delta F(1, 99) = 1.351, p = .248, \eta^2 = .012$).
Discussion

The findings of Study 5 failed to confirm my initial predictions regarding the effects of regulatory focus framing upon subsequent pro-environmental inclinations. I had predicted that feedback valence (i.e., praise versus reproach) and feedback framing (i.e., gain-framing versus loss-framing) would interact with participants’ dispositional promotion focus to influence participants’ pro-environmental inclinations. In particular, I predicted that pro-environmental inclinations would be highest among participants who received gain-framed praise and had a dispositional preference for promotion focus. The findings of Study 5, however, did not support this prediction with respect to any dependent measure of pro-environmental inclinations. Instead, analyses indicated that only participants’ dispositional prevention focus interacted with feedback valence and framing to influence participants’ subsequent pro-environmental inclinations. Though this interaction was not anticipated, it merits some consideration.

Dispositional prevention focus as a moderator of participants’ responses to feedback

The pro-environmental inclinations of participants who received loss-framed praise distinctly depended upon those participants’ dispositional levels of prevention focus. Participants who had lower levels of dispositional prevention focus and received loss-framed praise generally had lower pro-environmental behavioural intentions, identification with pro-environmental issues and EAI human utilization of nature scores than others; only those who possessed the greatest levels of dispositional prevention focus had pro-environmental inclinations that equalled those of participants in other feedback conditions. These findings indicate that behaviour-specific loss-framed praise is a deterrent to the pro-environmental inclinations of all but those individuals who are highly disposed to prevention-focused problem-solving strategies. For those who are highly disposed to prevention focus, behaviour-specific loss-framed praise is neither a deterrent nor a motivator to pro-environmental inclinations.
One explanation for this consistent pattern of findings is that loss-framed praise is doubly disregarded by individuals who are not very disposed to a prevention-focused approach to problem-solving. First, the framing of this feedback in terms of losses could lead less prevention-focused individuals to consider this feedback irrelevant to their chronic goals and problem-solving approaches. The fact that this feedback conveys a positive evaluation further suggests that, even if this feedback were relevant, there is no immediate cause for concern or behavioural change. The finding that some participants find behaviour-specific, loss-framed praise to be a deterrent to pro-environmental inclinations also provides a suggestive explanation for the unexpected effects of behaviour-specific feedback that were found in Studies 3 and 4. Participants in each of these studies were less pro-environmental across various measures after receiving behaviour-specific praise. Assuming that the participants in these studies were normally distributed in their levels of dispositional prevention focus, the aforementioned drop in pro-environmental inclinations following behaviour-specific praise may have resulted from the responses of less prevention-focused individuals to this form of feedback.

*Effects of feedback framing*

The framing of feedback was consistently found to influence participants’ pro-environmental inclinations in Study 5. Participants who received gain-framed feedback had greater pro-environmental behavioural intentions, were more identified with pro-environmental issues and demonstrated greater support for environmental preservation efforts than participants who received loss-framed feedback. Although this finding was not initially predicted, it is nevertheless promising with respect to this investigation’s overall aim toward using feedback as a means of increasing individuals’ pro-environmental inclinations. Overall, the findings of Study 5 indicate that gain-framed feedback was more motivating than the loss-framed feedback that is
typically applied to general audiences by major pro-environmental advocates (e.g., The Daily Green, 2007; WWF, 2009).

**Overall Conclusions**

Although the results of Study 5 were not as predicted, these findings yielded useful insight into the findings of previous studies while also indicating how pro-environmental advocates may use feedback to increase individuals’ pro-environmental inclinations. First, the results of Study 5 indicated that using behaviour-specific, loss-framed praise may backfire when it comes to persuading less prevention-focused individuals to become more pro-environmental. This may explain why the findings of Studies 3 and 4 indicated that behaviour-specific, loss-framed praise reduced participants’ pro-environmental inclinations relative to behaviour-specific, loss-framed reproach. The findings of Study 5 further indicated that behaviour-specific, gain-framed feedback has a more positive effect on participants’ pro-environmental inclinations than does behaviour-specific, loss-framed feedback. A gains-focused framing represents a stark divergence from the approach presently taken by pro-environmental advocates who utilize mass media to convey feedback to individuals regarding their pro-environmental performance. The effectiveness of gain-framed feedback at promoting increases in pro-environmental inclinations may plausibly result from either the novelty of such messages or from the emphasis that such messages place on gains, which could generally be more desirable to the average individual. This may be particularly true in a North American context, as past research indicates that North Americans are generally more promotion-focused than prevention-focused (Elliot, Chirkov, Kim, & Shek, 2001; Lee, Aaker, & Gardner, 2000; Lockwood, Marshall, & Sadler, 2005). Overall the results of Study 5 therefore indicate that, when using behaviour-specific feedback to influence pro-environmental inclinations, pro-environmental advocates are best advised to avoid loss-framing. Instead, feedback that is framed in terms of gains may be best suited to increasing
the pro-environmental inclinations of a general audience, regardless of the evaluation that members of that audience individually receive.

General Discussion

I undertook this investigation to examine whether the sort of feedback framing currently adopted by pro-environmental advocates is actually effective at enhancing pro-environmental inclinations. My central assumption was that these advocates had failed to employ an optimal method for convincing members of the public to become more pro-environmental. While my studies did demonstrate that the feedback format currently adopted by pro-environmental advocates is suboptimal, uncovering an ideal feedback format was, for the most part, elusive.

My studies took off on the divide between psychological research, which favours the use of positively-valenced praise feedback, and the applied practices of pro-environmental advocates, who favour negatively-valenced reproach feedback. A large body of psychological research has found praise feedback to be effective at motivating improved individual performance in competitive sports (Anderson et al., 1988) as well as workplace behaviors (Eikenhout & Austin, 2004; Lowman, 1997; Rice et al., 2009). Reproach feedback, on the other hand, can discourage individuals from performing effectively in the workplace (Fedor et al., 1989) and everyday social situations (Snyder & Newburg, 1981). Many of the online personal assessment tools (e.g., Center for Sustainable Economy, 2012; The Daily Green, 2007; WWF, 2009) and informational resources (Greenpeace, 2012; Lefurgye-Smith, McCall, Knauer & Rathje, 2012) that individuals may consult in order to obtain feedback concerning the quality of their own pro-environmental behaviours, however, are designed specifically for the purpose of conveying only reproachful feedback.

My investigations began by testing a straightforward form of praise and reproach feedback; a single, general feedback message. This format was analogous to the feedback format
that is often used by major public pro-environmental campaigns (e.g., Center for Sustainable Economy, 2012; WWF, 2009). Later studies (Studies 3-5) tested a more frequent, behaviour-specific feedback format and compared the effect of this format against the single, general message format. Overall, my studies indicate that the general feedback format presently favoured by pro-environmental advocates is ineffective if not detrimental to pro-environmental outcomes when reproach is specifically communicated. With respect to more frequent, behaviour-specific forms of feedback, gain-framed, behaviour-specific feedback showed the most promise as a means of using praise to enhance pro-environmental inclinations.

Summary of findings

Study 1 found that general reproach, the feedback framing most commonly employed to provide members of the public with feedback concerning pro-environmental efforts (e.g., Center for Sustainable Economy, 2012; The Daily Green, 2007; WWF, 2009), actually reduces individuals’ pro-environmental inclinations. Participants in this study underwent an experience that mimicked many common online feedback interfaces: they were asked multiple questions about their everyday habits and then given a single omnibus evaluation as feedback. Those who received reproach feedback in this format were less identified with pro-environmental issues than were participants who received either praise or no feedback at all. Study 1 also found that participants who received general reproach feedback had lower pro-environmental behavioural intentions than no-feedback controls. Study 2 also failed to find the recipients of any general feedback to be more pro-environmental than baseline controls. To test whether complacency was to blame for the ineffectiveness of general praise feedback, Study 2 examined whether explicit instructions to take up future pro-environmental behaviours could enhance the effectiveness of feedback at motivating pro-environmental behaviours. Even with these explicit suggestions included, participants who received general praise, like those who received general reproach, did
not differ from controls with respect to their pro-environmental behavioural intentions. Explicit instructions to take up pro-environmental behaviours only increased opposition to utilization of environmental resources among general praise recipients, indicating that praise only elicits complacency with respect to feedback recipients’ sense of entitlement to use environmental resources. Overall, both Study 1 and Study 2 failed to provide evidence that either general reproach or general praise feedback increase pro-environmental inclinations. Because this evidence failed to support the use of general, omnibus feedback as a means for convincing individuals to become more pro-environmental, I turned to a feedback format that showed more promise.

Participants’ lower pro-environmental inclinations following reproach feedback in Study 1 was consistent with the interpretation that these participants found such feedback to be self-determined (Deci & Ryan, 1987). That is, participants saw their autonomous pro-environmental efforts as yielding a poor outcome and thus decided to reduce these efforts. Recipients of general praise, on the other hand, did not appear to find this feedback sufficiently self-determined to similarly respond with increased pro-environmental inclinations. In subsequent studies, I therefore designed and used a behaviour-specific form of feedback, which participants were expected to experience as highly self-determined relative to general feedback.

As an alternative means of providing feedback on pro-environmental behaviours, I developed and tested a frequent, behaviour-specific feedback format in Studies 3 through 5. I reasoned that participants who received general feedback messages would experience difficulty at perceiving a clear association between the feedback they received and the specific behaviours that they reported on. Users of online environmental assessment applications that provide general feedback (e.g., the WWF’s EcoGuru), for instance, would have to complete a measure several times and submit different responses each time in order to get a sense of the performance criteria
behind the feedback they receive. Most individuals presumably do not make such efforts to understand the feedback provided by online assessment tools such as EcoGuru. This should leave individuals who receive such feedback with little a sense of the performance criteria underlying their evaluations.

The feedback format tested in Studies 3 through 5 was designed to overcome this shortcoming by using feedback messages that provided a consistent evaluation in relation to specific reported behaviours. Feedback conveyed in this format would clearly relate participants’ specific behaviours to specific subsequent evaluations. Feedback conveyed in a behaviour-specific format also included information about the environmental impact of specific behaviours, thus ensuring that feedback recipients could clearly conceptualize the association between specific behaviours and their environmental consequences. Overall, these qualities of behaviour-specific feedback were designed to enable participants to experience feedback as highly self-determined (Deci & Ryan, 1987). In other words, the feedback was designed to provide participants a high degree of felt control over the evaluations they received. I therefore predicted that behaviour-specific praise would increase participants’ pro-environmental inclinations, particularly pro-environmental behavioural intentions, relative to behaviour-specific reproach feedback. Contrary to this prediction, Study 3 found that participants who received behaviour-specific praise reported lower pro-environmental behavioural intentions than participants who received behaviour-specific reproach feedback.

Study 4 directly compared the effect of general and behaviour-specific feedback on pro-environmental inclinations, confirming that the general and behaviour-specific feedback formats differently affected participants’ subsequent pro-environmental inclinations. The findings of Study 4 replicated only the null findings of Studies 1 and 2 by failing to show any effect of general feedback, regardless of valence, upon pro-environmental behavioural intentions. Study 4
also confirmed the adverse impact of general reproach feedback upon participants’ identification with pro-environmental issues. Study 4 also replicated the findings of Study 3 by showing that participants who received praise in a behaviour-specific format were significantly less pro-environmental than those who received behaviour-specific reproach. They reported lower pro-environmental behavioural intentions and EAI human utilization of nature subscale scores.

These findings of Studies 3 and 4 made it clear that increasing the self-determined nature of praise was insufficient to persuade participants to adopt greater pro-environmental inclinations. In fact, participants appeared to reduce their pro-environmental inclinations after receiving behaviour-specific praise. This pattern of responding was consistent with the interpretation that participants understood pro-environmental acts, beliefs and attitudes as a chore rather than an element of self-identity. This interpretation would explain why more self-determined praise served to reduce pro-environmental inclinations. Participants treated this feedback as an indication that their chore was completed and needed little further effort, as opposed to a motivating validation of a set of personal characteristics. This interpretation accords with prevailing research findings and statistics regarding the public’s willingness to engage in pro-environmental activities: there is a high willingness to engage in some pro-environmental activities but much less willingness to make a long-term commitment to such behaviours (Joireman et al., 2009; Van Houwelingen & Van Raaij, 1989).

To test whether praise feedback could be more effective when matched to personal dispositions, I next considered regulatory focus as a moderator. Study 4 examined the ways that participants’ dispositional regulatory focus influenced their responses to praise or reproach feedback presented in either general or behaviour-specific format. Because praise feedback is most motivating when it is salient (e.g., Eikenhout & Austin, 2004) and because individuals who are more promotion-focused respond to positive evaluations with eagerness, as compared with
prevention-focused individuals, who respond to similar evaluations with quiescence (Higgins, 1997, 1998), I predicted that more dispositionally promotion-focused participants would respond more pro-environmentally after receiving praise. Prevention-focused individuals, on the other hand, were expected to respond more to negative evaluations such as reproach (Higgins, 1997, 1998). Because reproach feedback was not predicted to be an effective motivator of individuals’ pro-environmental inclinations (Rogers & Mewborn, 1976; Vallerand & Reid, 1984), I predicted that dispositional levels of prevention focus would not influence pro-environmental inclinations in response to feedback. However, Study 4 failed to support either of these predictions.

In Study 5, I set out to determine whether behaviour-specific praise could enhance participants’ pro-environmental inclinations when such feedback was framed in terms of gains as opposed to losses. The feedback used in Studies 1 through 4 employed loss-framed feedback to address participants’ pro-environmental performance, emphasizing waste and litter that had been either produced or prevented by participants’ actions. Such loss framing is representative of the ways that pro-environmental activities and issues are addressed in popular media (e.g., Conners, Conners & DiCaprio, 2007; Rees, 2003; WWF, 2009). In Study 5, I compared loss-framed praise and reproach against gain-framed praise and reproach feedback. I predicted that participants’ dispositional promotion- and prevention focus would moderate their responses to each feedback format. I predicted that gain-framed praise would be most effective at enhancing the pro-environmental inclinations of individuals who were more dispositionally promotion-focused, as promotion-focused individuals find gain-framed information to be more congruent with their chronic goals (Lockwood et al., 2002) and, as described above, respond to positive evaluations with eagerness rather than quiescence (Higgins, 1997, 1998). Study 5 did not confirm this prediction. Instead, the results of Study 5 showed that feedback framing had a significant main effect on participants’ pro-environmental inclinations. On measures of pro-environmental
behavioural intentions, identification with pro-environmental issues and support for environmental preservation efforts, participants who received gain-framed feedback were more pro-environmental than those who received loss-framed feedback. On a general level, these findings were at least consistent with my initial prediction that some individuals will respond more pro-environmentally after receiving gain-framed praise feedback. What was not predicted, however, was the finding that any gain-framed feedback would be an effective motivator of pro-environmental inclinations across individuals.

The findings of Study 5 further demonstrated the difficulties of increasing participants’ pro-environmental inclinations significantly above baseline levels. Even when feedback was framed to match participants’ dispositional regulatory focus, participants did not show significantly increased pro-environmental inclinations. Nevertheless, this study yielded the unexpected and useful finding that gain-framed feedback was a more effective tool for motivating pro-environmental inclinations than loss-framed feedback. As most popular pro-environmental media and feedback tools focus on waste (Center for Sustainable Economy, 2012; The Daily Green, 2007; WWF, 2009) and environmental losses (Greenpeace, 2012; Lefurgey-Smith, McCall et al., 2012), those who communicate with the public on behalf of pro-environmental causes have reason to take particular notice of this finding. One explanation for the finding is that individuals have simply become fatigued with loss-framed pro-environmental messages (Simon, 1982). Gain-framed messages, on the other hand, may offer a new and interesting approach to pro-environmental behaviours and issues. Another explanation may lie with the finding that North Americans as a group tend to generally favour a promotion-focused regulatory disposition over a prevention-focused one (Lee et al., 2000). As such, a gain-framed feedback may generally be found to be more appealing across a North American audience or participant group.
In either case, this unexpected but promising finding suggests that the positive framing needed to enhance pro-environmental inclinations is more subtle than just offering praise in the place of reproach. Rather, a reframing of pro-environmental issues as opportunities for gains rather than means to avoid losses may be the key to persuading individuals to take up pro-environmentalism as more than a mere chore.

**Overall conclusions**

Studies 1 through 5 addressed the need for change in the ways that feedback is used in mass media to enhance pro-environmental inclinations. Across studies, no evidence was found to support the use of general omnibus feedback for this purpose. Indeed, general reproach feedback was found to reduce participants’ inclinations to identify with pro-environmental issues. Feedback that was delivered in a behaviour-specific format, on the other hand, led to reduced pro-environmental behavioural intentions when participants received praise. When behaviour-specific feedback was framed in terms of gains rather than losses, however, participants showed greater pro-environmental inclinations regardless of the evaluation conveyed. The finding that gain-framed praise can be used to enhance individuals’ pro-environmental inclinations is particularly promising in the face of research that points to the lasting nature of behavioural changes that may result from praise feedback. Recipients of praise tend to more closely identify with sources of praise (Johnson et al., 2004), such as pro-environmental advocates, and do better at remembering the informational content of such feedback over long periods (Ilgen, Fisher & Taylor, 1979). These outcomes, at the very least, suggest a strong potential for long-term change, as individuals need to identify with pro-environmental advocates and remain mindful of the impact that behaviours have upon the environment in order to set high personal standards in this domain and consistently monitor the quality of their pro-environmental performance (Crowell et al., 1988; Rice et al., 2009). Reproach feedback, meanwhile, is known to result in aversive
responses and avoidance (Fedor et al., 1989; Snyder & Newburg, 1981). This is not an entirely undesirable outcome, however, as such feedback may be a useful means of affecting immediate, short-term changes in behaviour. If and when such temporary impact upon pro-environmental behaviours is the sole intent of pro-environmental advocates, the results of my investigations indicate that reproach feedback that is conveyed in a behaviour-specific, gain-framed format yields optimal outcomes. The best potential source of long-term increases in pro-environmental inclinations, however, is behaviour-specific, gain-framed praise feedback.

**Limitations and future directions**

To my knowledge, this series of studies was the first to systematically investigate the effects of feedback framing upon pro-environmental inclinations. This necessitated taking a straightforward approach that first examined the effects of manipulations that closely mimicked real-life feedback found in online assessments such as EcoGuru (WWF, 2009), followed by adjustments according to observed results. There remains, however, much room for future studies to test the effects of various alternative feedback formats.

To isolate the effects of praise and reproach feedback, each of the studies described above focused on responses to feedback that was either exclusively positive (praise) or exclusively negative (reproach). Neither form of feedback, however, need necessarily be administered to the exclusion of the other. As some research in the field of sports psychology suggests, praise and reproach feedback used in tandem can be more effective at motivating performance than using either form of feedback alone (Kirschenbaum & Smith, 1983). The challenge of achieving this effect depends on achieving an ideal ratio of praise to reproach feedback (Kirschenbaum & Smith, 1983). Research on romantic relationships finds that a ratio of five positive interactions for every one negative interaction produces optimal outcomes with respect to relationship quality and longevity (Gottman, 1994). A similar ratio of positive (e.g.,
“good work”) to negative (e.g., “You’ve made an error”) feedback has also been found to
improve the problem-solving performance of people working in teams (Losada, 1999). These
findings suggest that individuals are ideally satisfied and motivated to perform a task after
receiving both reproach and praise feedback in a ratio that favours praise but includes occasional
reproach as well. One explanation for the effectiveness of this particular ratio may be that praise
is made more noticeable and thus more satisfying when experienced amid the possibility of
receiving reproach. As operant research has long-established, a desired outcome that is
occasionally interrupted by a non-desired outcome is more motivating than a constant,
uninterrupted series of desired outcomes (Ferster & Skinner, 1957). Future research may
therefore test whether frequent, behaviour-specific praise and reproach feedback is more or less
effective at enhancing individuals’ pro-environmental inclinations according to the ratio in which
these evaluations are administered. Determining an optimal ratio would also provide a valuable
metric for comparing pro-environmental behaviours with other, perhaps more personally
meaningful behaviours (e.g., romantic relationships). Specifically, the magnitude of a pro-
environmental “magic ratio” relative to the 5:1 ratio that applies in other domains will help
identify the extent of the reward necessary to motivate pro-environmental inclinations relative to
other sorts of behaviours.

Future investigations and applications of behaviour-specific feedback might also consider
administering such messages in a way that is more carefully targeted to a specific subset of
individuals’ behaviours. In each of the studies detailed above, participants received feedback
concerning a wide variety of common everyday behaviours that significantly impact the
environment. These behaviours ranged from recycling used products to the consumption of meat
in one’s diet. Depending on the individual in question, however, each of these behaviours will
certainly differ in terms of personal salience. Some participants may also have found that the
environment-related behaviours they consider important were not included in the questionnaire that I administered. To address the first point, future researchers may include a measure of personal salience to assess and control for the importance that individuals attach to feedback concerning particular pro-environmental behaviours. In accordance with past findings that demonstrate the effectiveness of praise in work situations (Eikenhout, & Austin, 2004; Lowman, 1997; Rice et al., 2009), behaviour-specific praise feedback may do best at motivating behaviours that individuals consider most salient to their everyday lives. Negatively-valenced information such as reproach, on the other hand, captures the attention of recipients more effectively than positively-valenced information (Fiske, 1980; Wason, 1959). Behaviour-specific reproach feedback may therefore raise the profile of low-salience environmental behaviours so that these will be more actively and carefully considered in future decision-making. To address the concern that questionnaires are bound to omit behaviours that some individuals consider salient to their pro-environmental performance, a more open-ended format may be ideal for determining individuals’ most and least salient pro-environmental behaviours before providing behaviour-specific feedback accordingly. Undoubtedly, such efforts would require much added work and investment at their outset. When considered in light of the scale and urgency of the present ecological crisis, however, such effort is certainly justified.

A final notable shortcoming of my studies is that they did not measure the actual pro-environmental behaviours of participants following the administration of feedback messages. Though extensive research demonstrates that behavioural intentions are a strong and reliable predictor of actual behaviour, this relationship is not perfect (Ajzen, Czasch & Flood, 2009; Bamberg & Möser, 2007). This could be problematic, however, if the effects of behaviour-specific feedback are short-lived (i.e., sufficient to affect reported intentions in the laboratory but insufficient to carry over to everyday behaviours), in which case the actual differences between
groups’ behaviours will have been exaggerated by measures of pro-environmental behavioural intentions following behaviour-specific feedback. Research on the use of behaviour-specific feedback as a means of promoting public health, however, indicates that such feedback produces lasting effects that include changes to feedback recipients’ everyday behaviours (Lustria et al., 2009; Noar et al., 2007). Measuring actual pro-environmental behaviours may also present a cumbersome task to researchers – as different individuals will have very different ideas of what constitutes such behaviour, making it difficult to achieve a fair measure across large samples.

**Closing remarks**

The findings of these studies shed light on the need for pro-environmental advocates to consider changing their approach to communicating with members of the general public – particularly where the use of online assessment tools and feedback is concerned. It is both surprising and significant that, until now, systematic research has not investigated the effects of feedback framing upon pro-environmental inclinations. Despite this, pro-environmental advocates have clearly invested much time, effort and resources into communications that frame pro-environmental issues in a negatively-valenced, reproachful light, emphasizing losses incurred rather than gains to be made. It makes intuitive sense to presume that the dire state of the natural environmental and the urgent need for changes should be communicated through messages that reproach individuals’ pro-environmental efforts. What is intuitive, however, is not always most effective. Reproach feedback may very well capture people’s attention, but the general, omnibus reproach feedback that is currently used by pro-environmental advocates only serves to reduce people’s willingness to identify with pro-environmental issues and behave pro-environmentally, without conveying the information needed for individuals to change their behaviours. It may be the case that, after years of dire warnings about the state of the environment, many individuals are simply fatigued with general, reproachful feedback.
concerning their environment-related behaviours. As such, people may simply learn to see such feedback as a general deterrent to being identified with and involved in pro-environmental causes – why invest oneself in something where one can do no right? As a result, people come to understand pro-environmental behaviours as chores rather than personally fulfilling personal commitments.

Behaviour-specific feedback, on the other hand, does appear to convey meaningful information regarding pro-environmental behaviours and can affect significant changes to individuals’ future pro-environmental behaviours. My studies determined that the most promising form of behaviour-specific feedback is gain-framed feedback, which results in greater pro-environmental behavioural inclinations than does the loss-framed feedback that is more typically used in popular communications.

One of the most daunting obstacles to the persuasive effectiveness of feedback that calls for individuals to increase their pro-environmental efforts is the fact that such individual effort is meant to serve an apparently collective goal. As exemplified in concepts such as the free rider phenomenon and social loafing (Karau & Williams, 1993), collective goals ironically tend to produce poor individual efforts. Though individuals are generally not well motivated to act in service of collective goals, individuals are highly motivated to act on goals where they have a sense of personal ownership, both generally (Deci & Ryan, 1987) and with respect to the environment (Osbaldiston & Sheldon, 2003; Pelletier, Tuson, Green-Demers, Noels & Beaton, 1998). Interactive, web-based technologies make it increasingly feasible to tailor feedback to specific individuals and behaviours while nevertheless reaching a large audience. Many individuals are searching for ways to understand the environmental impact of their behaviours and to change these in order to become more environmentally friendly (Mazur, 2011; McKenzie-Mohr, 2000; Van Houwelingen & Van Raaij, 1989; WWF, 2009). This represents a tremendous
opportunity for pro-environmental advocates to use feedback as a tool for bringing about meaningful change in the ways that people understand and behave in relation to the environment. These studies lay out the beginnings of a roadmap for effectively using behaviour-specific feedback to bring about meaningful increases in pro-environmental inclinations. It is incumbent on pro-environmental advocates to capitalize on modern media technologies in order to put these findings into practice.
References


Government of Canada (June 20, 2012) *Environment – Transportation* in Human Resources and Skills Development Canada <http://www4.hrsdc.gc.ca/3ndic.l4t.4r@-eng.jsp?iid=67>


# Tables

Table 1

*Study 1: Average self-rated pro-environmental attitudes, beliefs and behavioral intentions by valence of general feedback received*

<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Opposition toward human utilization of nature (EAI)</th>
<th>Support for personal conservation behavior (EAI)</th>
<th>Behavioral Intentions</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise (n = 111)</td>
<td>4.07 (1.04)</td>
<td>4.98 (1.04)</td>
<td>4.63 (1.13)</td>
<td>3.38 (.75)</td>
</tr>
<tr>
<td>Reproach (n = 102)</td>
<td>3.91 (1.01)</td>
<td>4.79 (1.00)</td>
<td>4.42 (1.12)</td>
<td>2.96 (.66)</td>
</tr>
<tr>
<td>Control (n = 49)</td>
<td>4.04 (1.02)</td>
<td>5.05 (1.01)</td>
<td>4.93 (1.06)</td>
<td>3.36 (.64)</td>
</tr>
</tbody>
</table>

*Note.* Values on the Identification scale represent scores on a 5-point scale (range 1 to 5). All other values represent scores on a 7-point scale (range 1 to 7). In all cases, greater scores represent more pro-environmental responses.
Table 2

Study 2: Average self-rated pro-environmental attitudes, beliefs and behavioral intentions by type of feedback received

<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Opposition toward human utilization of nature (EAI)</th>
<th>Support for personal conservation behavior (EAI)</th>
<th>Behavioral Intentions</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise (n = 42)</td>
<td>3.94 (.20)</td>
<td>4.75 (.18)</td>
<td>4.23 (.19)</td>
<td>3.23 (.12)</td>
</tr>
<tr>
<td>Praise (n = 44)</td>
<td>4.72 (.18)</td>
<td>5.10 (.18)</td>
<td>4.86 (.19)</td>
<td>3.50 (.12)</td>
</tr>
<tr>
<td>with room</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reproach (n = 44)</td>
<td>4.26 (.20)</td>
<td>4.80 (.18)</td>
<td>4.52 (.19)</td>
<td>3.21 (.12)</td>
</tr>
<tr>
<td>Reproach (n = 46)</td>
<td>4.28 (.17)</td>
<td>4.68 (.18)</td>
<td>4.49 (.18)</td>
<td>3.08 (.12)</td>
</tr>
<tr>
<td>with room</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (n = 40)</td>
<td>4.39 (.18)</td>
<td>5.11 (.19)</td>
<td>4.70 (.20)</td>
<td>3.57 (.13)</td>
</tr>
</tbody>
</table>

*Note.* Values on the Identification scale represent scores on a 5-point scale (range 1 to 5). All other values represent scores on a 7-point scale (range 1 to 7). In all cases, greater scores represent more pro-environmental responses.
Table 3

Study 3: Average self-rated pro-environmental attitudes, beliefs and behavioral intentions by valence of behaviour-specific feedback received

<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Opposition toward human utilization of nature (EAI)</th>
<th>Support for personal conservation behavior (EAI)</th>
<th>Behavioral Intentions</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise ( (n = 20) )</td>
<td>4.20 (.18)</td>
<td>4.37 (.20)</td>
<td>4.22 (.21)</td>
<td>3.05 (.16)</td>
</tr>
<tr>
<td>Reproach ( (n = 18) )</td>
<td>4.86 (.19)</td>
<td>5.29 (.21)</td>
<td>4.94 (.22)</td>
<td>3.42 (.17)</td>
</tr>
<tr>
<td>Neutral ( (n = 14) )</td>
<td>4.34 (.22)</td>
<td>4.55 (.23)</td>
<td>4.74 (.25)</td>
<td>3.34 (.20)</td>
</tr>
</tbody>
</table>

Note. Values on the Identification scale represent scores on a 5-point scale (range 1 to 5). All other values represent scores on a 7-point scale (range 1 to 7). In all cases, greater scores represent more pro-environmental responses.

Table 4

Study 4: Average self-rated pro-environmental attitudes, beliefs and behavioral intentions by valence and format of feedback received

<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Opposition toward human utilization of nature (EAI)</th>
<th>Support for personal conservation behavior (EAI)</th>
<th>Behavioral Intentions</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Praise ( (n = 28) )</td>
<td>4.64 (.17)</td>
<td>5.38 (.19)</td>
<td>4.86 (.19)</td>
<td>3.75 (.14)</td>
</tr>
<tr>
<td>General Reproach ( (n = 28) )</td>
<td>4.39 (.17)</td>
<td>4.89 (.15)</td>
<td>4.60 (.19)</td>
<td>3.26 (.14)</td>
</tr>
<tr>
<td>Behaviour-specific Praise ( (n = 27) )</td>
<td>3.95 (.20)</td>
<td>5.04 (.19)</td>
<td>4.12 (.22)</td>
<td>3.33 (.13)</td>
</tr>
<tr>
<td>Behaviour-specific Reproach ( (n = 29) )</td>
<td>4.84 (.20)</td>
<td>5.20 (.18)</td>
<td>4.93 (.21)</td>
<td>3.59 (.13)</td>
</tr>
<tr>
<td>Control ( (n = 33) )</td>
<td>4.55 (.15)</td>
<td>4.87 (.17)</td>
<td>4.67 (.17)</td>
<td>3.48 (.12)</td>
</tr>
</tbody>
</table>

Note. Values on the Identification scale represent scores on a 5-point scale (range 1 to 5). All other values represent scores on a 7-point scale (range 1 to 7). In all cases, greater scores represent more pro-environmental responses.
Table 5

*Study 5: Average self-rated pro-environmental attitudes, beliefs and behavioral intentions by type of feedback received*

<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Opposition toward human utilization of nature (EAI)</th>
<th>Support for personal conservation behavior (EAI)</th>
<th>Behavioral Intentions</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss-framed praise (n = 26)</td>
<td>4.51 (.16)</td>
<td>4.78 (.21)</td>
<td>4.39 (.20)</td>
<td>3.31 (.16)</td>
</tr>
<tr>
<td>Loss-framed Reproach (n = 27)</td>
<td>4.01 (.16)</td>
<td>4.44 (.20)</td>
<td>4.31 (.20)</td>
<td>2.89 (.16)</td>
</tr>
<tr>
<td>Gain-framed praise (n = 26)</td>
<td>4.79 (.16)</td>
<td>5.18 (.20)</td>
<td>5.07 (.20)</td>
<td>3.39 (.16)</td>
</tr>
<tr>
<td>Gain-framed reproach (n = 29)</td>
<td>4.75 (.16)</td>
<td>5.04 (.20)</td>
<td>5.01 (.20)</td>
<td>3.29 (.15)</td>
</tr>
<tr>
<td>Control (n = 31)</td>
<td>4.60 (.15)</td>
<td>4.94 (.19)</td>
<td>4.72 (.18)</td>
<td>3.12 (.15)</td>
</tr>
</tbody>
</table>

*Note.* Values on the Identification scale represent scores on a 5-point scale (range 1 to 5). All other values represent scores on a 7-point scale (range 1 to 7). In all cases, greater scores represent more pro-environmental responses.
Figures

Figure 1

Study 5: Bivariate relation between chronic prevention focus and pro-environmental behavioral intentions in praise feedback condition

![Graph showing the relationship between chronic prevention focus and pro-environmental behavioral intentions for different feedback types.](image)
Figure 2

*Study 5: Bivariate relation between chronic prevention focus and pro-environmental behavioral intentions in reproach feedback condition*

![Figure 2](image)

Figure 3

*Study 5: Bivariate relation between chronic prevention focus and identification with pro-environmental issues in praise feedback condition*

![Figure 3](image)
Figure 4

*Study 5: Bivariate relation between chronic prevention focus and identification with pro-environmental issues in reproach feedback condition*

![Graph showing the relationship between chronic prevention focus and identification with pro-environmental issues in a reproach feedback condition.](image)

Figure 5

*Study 5: Bivariate relation between chronic prevention focus and opposition toward human utilization of nature (EAI) in praise feedback condition*

![Graph showing the relationship between chronic prevention focus and opposition toward human utilization of nature in a praise feedback condition.](image)
Figure 6

Study 5: Bivariate relation between chronic prevention focus and opposition toward human utilization of nature (EAI) in reproach feedback condition
Appendices

Appendix A - Questionnaire concerning everyday environmental behaviors (Studies 1-5)

1. In an average week, how many times do you use a reusable bag instead of using a plastic bag?
2. In an average week, how often do you drink coffee or other drinks from a disposable cup?
3. On average, how many minutes per day do you spend showering?
4. In an average week, how often do you eat take-out food instead of a meal prepared at home or in your residence?
5. In an average day, for how many hours is your computer turned off? [Participants had the option of indicating “I keep my computer turned on all day.”]
6. What percentage of your home’s lightbulbs are energy saving bulbs?
7. In an average week, how many hours do you spend watching television?
8. Each week, how often do you take public transit instead of traveling by car? [Participants had the option of indicating “I never take public transit” and “I never travel by car.”]
9. In an average month, approximately how many sheets of paper did you print out when you didn’t absolutely need to?
10. In an average month, how many of your meals include organic foods?
11. In the past month, how many times have you thrown away food?
12. How many paper or plastic items do you throw into recycling bins (as opposed to garbage cans) in an average week?
13. In an average month, how many loads of laundry do you wash in cold water instead of warm or hot water?
14. In an average month, how many loads of laundry do you dry without cleaning the dryer’s lint trap?
15. In an average week, how many beverages (e.g. water, pop) do you consume from plastic bottles?
16. In an average week, how many of your meals contain beef?
17. In an average week, how many plastic utensils (forks, knives and spoons) do you use and then throw away?
18. In an average week, how many times do you use a standard oven to cook or bake a meal?
19. In an average week, how many disposable paper napkins (e.g., Kleenex, restaurant napkins) do you use?
20. In an average week, how many times do you use a microwave oven to heat up a meal?
21. In an average day, for how many hours is your cell phone charger plugged in?
Appendix B – Questionnaire concerning everyday environmental behaviors including behaviour-specific feedback by condition (Studies 4 and 5)

1. In an average week, how many times do you use a reusable bag instead of using a plastic bag?

Praise: Good work! For every time you used a reusable bag instead of a plastic bag every week, you have prevented 20 pounds of plastic waste from entering landfills in the past year.
Control: If you use just one less plastic bag every week, you could prevent 20 pounds of plastic waste from entering landfills over the course of a year.
Reproach: Ouch! For every plastic bag that you used instead of a reusable bag every week, you have added 20 pounds of plastic waste to landfills in the past year.

2. In an average week, how often do you drink coffee or other drinks from a disposable cup?

Praise: Good work! By using disposable cups (response) times each week rather than (response +1), you have prevented 10 pounds of paper waste from entering landfills in the past year.
Control: If you use just one less disposable cup every week, you could prevent 10 pounds of paper waste from entering landfills over the course of a year.
Reproach: Ouch! For every disposable cup you used every week, you have added 10 pounds of paper waste to landfills in the past year.

3. On average, how many minutes per day do you spend showering?

Praise: Good work! By showering for (response) minutes instead of (response +1) minutes, you have prevented 6000 litres of water from being wasted in the past year.
Control: If you showered for just one minute less every day, you could prevent 6000 litres of water from going to waste over the course of a year.
Reproach: Ouch! For every minute you spent in the shower on a daily basis, you have caused 6000 additional litres of water to go to waste in the past year.

4. In an average week, how often do you eat take-out food instead of a meal prepared at home or in your residence?

Praise: Good work! For each time you ate a homemade/residence meal instead of take-out every week, you have prevented 20 pounds of waste from entering landfills in the past year.
Control: If you ate a homemade/residence meal instead of take-out just one more time every week, you could prevent 20 pounds of waste from entering landfills over the course of a year.
Reproach: Ouch! For each time you ate take-out instead of a homemade/residence meal every week, you have increased landfill waste by 20 pounds in the past year.
5. In an average day, for how many hours is your computer turned off? [Participants had the option of indicating “I keep my computer turned on all day.”]

Praise: Good work! For every hour that you left your computer off every day, you have reduced emissions by 3000 pounds in the past year.
Control: If you turned your computer off for one more hour every day, you could prevent 3000 pounds of emissions from entering the atmosphere over the course of a year.
Reproach: Ouch! For every hour that you left your computer on every day, you have increased emissions by 3000 pounds in the past year.

6. What percentage of your home’s lightbulbs are energy saving bulbs?

Praise: Good work! For every energy-saving bulb you used instead of a traditional incandescent bulb, you have reduced emissions by 300 pounds in the past year.
Control: If you replace just one more of your incandescent light bulbs with an energy-saving bulb, you could reduce emissions by 300 pounds over the course of a year.
Reproach: Ouch! For every incandescent light bulb you have used, you have increased emissions by 300 pounds in the past year.

7. In an average week, how many hours do you spend watching television?

Praise: Good work! For every hour that you left the television turned off every week, you have reduced emissions by 400 pounds in the past year.
Control: If you spent just one less hour watching television every week, you could reduce emissions by 400 pounds over the course of a year.
Reproach: Ouch! For every hour spent watching television every week, you have increased emissions by 400 pounds in the past year.

8. Each week, how often do you take public transit instead of travelling by car? [Participants had the option of indicating “I never take public transit” and “I never travel by car.”]

Praise: Good work! For each weekly trip that you take on public transit as opposed to using a car, you have reduced emissions by 700 pounds in the past year.
Control: If you travel by public transit instead of by car just one more time per week, you could reduce emissions by 700 pounds over the course of a year.
Reproach: Ouch! For every trip taken by car instead of public transit every week, you have increased emissions by 700 pounds in the past year.

9. In an average month, approximately how many sheets of paper did you print out when you didn’t absolutely need to?

Praise: Good work! For every two sheets of paper that you avoided printing unnecessarily in the past month, you have prevented 12 litres of chemical waste from being dumped into the water system over the past year.
Control: If you reduced your unnecessary printing by just 2 sheets every month, you could prevent 12 litres of chemical waste from entering the water system over the course of a year.
Reproach: Ouch! For every two sheets that you printed unnecessarily every month, you have increased the amount of chemical waste in the water system by 12 litres in the past year.
10. In an average month, how many of your meals include organic foods?

Praise: Good work! Every organic meal that you ate on a monthly basis has prevented 120 pounds of nitrogen fertilizer from being sprayed into the environment in the past year.
Control: If you included organic foods in just one more meal each month, you could prevent 120 pounds of nitrogen fertilizer from being sprayed into the environment over the course of a year.
Reproach: Ouch! Every time you ate a meal that did not include organic foods each month, you increased the amount of nitrogen fertilizer being sprayed into the environment by 120 pounds in the past year.

11. In the past month, how many times have you thrown away food?

Praise: Good work! Each time you avoided throwing away food every month, you have reduced emissions by 12 pounds in the past year.
Control: If you avoided throwing away food just one more time each month, you could reduce emissions by 12 pounds over the course of a year.
Reproach: Ouch! Each time that you threw away food every month, you have increased emissions by 12 pounds in the past year.

12. How many paper or plastic items do you throw into recycling bins (as opposed to garbage cans) in an average week?

Praise: Good work! For each item that you recycled every week, you have prevented 10 pounds of waste from entering landfills in the past year.
Control: If you recycled just one more paper or plastic item every week, you could reduce the waste in landfills by 10 pounds over the course of a year.
Reproach: Ouch! For every item that you threw into the trash instead of recycling every week, you have increased landfill waste by 10 pounds in the past year.

13. In an average month, how many loads of laundry do you wash in cold water instead of warm or hot water?

Praise: Good work! For each laundry load that you washed in cold water every month, you have reduced emissions by 78 pounds in the past year.
Control: If you washed just one more laundry load in cold water every month, you could reduce emissions by 78 pounds over the course of a year.
Reproach: Ouch! For each laundry load that you did not wash in cold water every month, you have increased emissions by 78 pounds in the past year.
14. In an average month, how many loads of laundry do you dry without cleaning the dryer’s lint trap?

Praise: Good work! Each time you cleaned the lint trap before drying a load of laundry every month, you have reduced emissions by 100 pounds in the past year.
Control: If you cleaned the lint trap before drying a laundry load just one more time every month, you could reduce emissions by 100 pounds over the course of a year.
Reproach: Ouch! For each time you did not clean the lint trap before drying a laundry load every month, you have increased emissions by 100 pounds in the past year.

15. In an average week, how many beverages (e.g. water, pop) do you consume from plastic bottles?

Praise: Good work! By consuming (response) instead of (response + 1) plastic bottles every week, you have reduced emissions by 12 pounds in the past year.
Control: If you consumed (response - 1) instead of (response) plastic bottles every week, you could reduce emissions by 12 pounds over the course of a year.
Reproach: Ouch! By consuming (response) instead of (response - 1) plastic bottles every week, you have increased emissions by 12 pounds in the past year.

16. In an average week, how many of your meals contain beef?

Praise: Good work! By consuming beef in (response) instead of (response + 1) meals every week, you have prevented 31,000 gallons of water from going to waste in the past year.
Control: If you consumed beef in (response - 1) instead of (response) meals every week, you could prevent 31,000 gallons of water from going to waste over the course of a year.
Reproach: Ouch! By consuming beef in (response) instead of (response - 1) meals every week, you have increased water waste by 31,000 gallons in the past year.

17. In an average week, how many plastic utensils (forks, knives and spoons) do you use and then throw away?

Praise: Good work! By using (response) instead of (response + 1) plastic utensils every week, you have prevented 5 pounds of plastic waste from entering landfills in the past year.
Control: If you used (response - 1) instead of (response) plastic utensils every week, you could prevent 5 pounds of plastic waste from entering landfills over the course of a year.
Reproach: Ouch! By using (response) instead of (response - 1) plastic utensils every week, you have increased the amount of plastic waste entering landfills by 5 pounds in the past year.
18. In an average week, how many times do you use a standard oven to cook or bake a meal?

Praise: Good work! By using the oven (response) instead of (response + 1) times every week, you have reduced emissions by 300 pounds in the past year.
Control: If you used the oven (response - 1) instead of (response) times every week, you could reduce emissions by 300 pounds over the course of a year.
Reproach: Ouch! By using the oven (response) instead of (response - 1) times every week, you have increased emissions by 300 pounds in the past year.

19. In an average week, how many disposable paper napkins (e.g., Kleenex, restaurant napkins) do you use?

Praise: Good work! By using (response) instead of (response + 2) paper napkins every week, you have prevented 10 pounds of paper waste from entering landfills in the past year.
Control: If you used (response - 2) instead of (response) paper napkins every week, you could prevent 10 pounds of paper waste from entering landfills over the course of a year.
Reproach: Ouch! By using (response) instead of (response - 2) paper napkins every week, you have increased the amount of paper waste entering landfills by 10 pounds in the past year.

20. In an average week, how many times do you use a microwave oven to heat up a meal?

Praise: Good work! By using the microwave oven (response) instead of (response + 1) times every week, you have reduced emissions by 5 pounds in the past year.
Control: If you used the microwave oven (response - 1) instead of (response) times every week, you could reduce emissions by 5 pounds over the course of a year.
Reproach: Ouch! By using the microwave oven (response) instead of (response - 1) times every week, you have increased emissions by 5 pounds in the past year.

21. In an average day, for how many hours is your cell phone charger plugged in?

Praise: Good work! For every hour that you left your cell phone charger unplugged every day, you have reduced emissions by 60 pounds in the past year.
Control: If you left your cell phone charger unplugged for just one more hour every day, you could reduce emissions by 60 pounds over the course of a year.
Reproach: Ouch! For every hour that you left your cell phone charger plugged in every day, you have increased emissions by 60 pounds in the past year.
Appendix C - Questionnaire concerning everyday environmental behaviors including behavior-specific gain-framed and loss-framed feedback by condition (Study 5)

1. In an average week, how many times do you use a reusable bag instead of using a plastic bag?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of plastics. This prevents unnecessary waste from adding to the swell of landfills.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of plastics. This allows unnecessary waste to add to the swell of landfills.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to plastics. This helps to achieve a cleaner environment.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to plastics. This falls short of what is necessary to achieve a cleaner environment.

2. In an average week, how many times do you drink coffee or other drinks from a disposable cup?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of paper products. This prevents unnecessary waste from adding to the swell of landfills.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of paper products. This allows unnecessary waste to add to the swell of landfills.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to paper products. This helps to achieve a cleaner environment.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to paper products. This falls short of what is necessary to achieve a cleaner environment.

3. On average, how many minutes per day do you spend showering?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of water. This prevents unnecessary wasting of valuable fresh water supplies.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of water. This unnecessarily wastes valuable fresh water supplies.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your water savings. This helps to achieve a more clean fresh water supply.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your water savings. This falls short of what is necessary to achieve a more clean fresh water supply.
4. In an average week, how many times do you eat take-out food instead of a meal prepared at home or in your residence?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of food packaging. This prevents unnecessary waste from adding to the swell of landfills.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of food packaging. This allows unnecessary waste to add to the swell of landfills.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to food packaging. This helps to achieve a cleaner environment.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to food packaging. This falls short of what is necessary to achieve a cleaner environment.

5. In an average week, how many times do you use a microwave oven to heat up a meal?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.

6. In an average week, how many disposable paper napkins (e.g., Kleenex, restaurant napkins) do you use?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of paper products. This prevents unnecessary waste from adding to the swell of landfills.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of paper products. This allows unnecessary waste to add to the swell of landfills.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to paper products. This helps to achieve a cleaner environment.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to paper products. This falls short of what is necessary to achieve a cleaner environment.
7. In an average day, for how many hours is your cell phone charger plugged in?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.

8. In an average week, how many times do you use a standard oven to cook or bake a meal?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.

9. In an average week, how many plastic utensils (forks, knives and spoons) do you use and then throw away?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of plastics. This prevents unnecessary waste from adding to the swell of landfills.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of plastics. This allows unnecessary waste to add to the swell of landfills.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to plastics. This helps to achieve a cleaner environment.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to plastics. This falls short of what is necessary to achieve a cleaner environment.
10. How many paper or plastic items do you throw into recycling bins (as opposed to garbage cans) in an average week?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of paper and plastic items. This goes a long way toward preventing unnecessary waste from adding to the swell of landfills.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of paper and plastic items. This allows significant amounts of unnecessary waste to add to the swell of landfills.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing the recycling of paper and plastic items. This goes a long way toward helping to achieve a cleaner environment.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing the recycling of paper and plastic items. This falls far short of what is necessary to achieve a cleaner environment.

11. In an average week, how many beverages (e.g. water, pop) do you consume from plastic bottles?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of plastics. This prevents unnecessary waste from adding to the swell of landfills.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of plastics. This allows unnecessary waste to add to the swell of landfills.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to plastics. This helps to achieve a cleaner environment.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to plastics. This falls short of what is necessary to achieve a cleaner environment.

12. In an average week, how many of your meals DO NOT contain beef?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your consumption of beef products. This prevents the unnecessary wasting of water by the meat farming process.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your consumption of beef products. This allows water to be unnecessarily wasted by the meat farming process.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your consumption of alternatives to beef. This helps to achieve a more clean fresh water supply.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your consumption of alternatives to beef. This falls short of what is necessary to achieve a more clean fresh water supply.
13. In an average day, for how many hours is your computer turned off? (Enter "0" if your computer is NEVER turned off)

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.

14. What percentage of your home’s lightbulbs are energy saving bulbs?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.

15. In an average week, how many hours do you spend watching television?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.
16. In an average week, how many trips do you make using public transit instead of travelling by car? (Enter "0" if you NEVER USE public transit)

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your individual car usage. This prevents unnecessary emissions from entering the atmosphere and air we breathe.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your individual car usage. This allows unnecessary emissions to enter the atmosphere and air we breathe.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your usage of public transit. This helps to achieve more sustainable cities and healthy air quality.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your usage of public transit. This falls short of what is necessary to achieve more sustainable cities and healthy air quality.

17. In an average month, approximately how many sheets of paper did you print out when you didn’t

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of paper. This helps prevent the unnecessary cutting down of valuable forests.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of paper. This allows valuable forests to be unnecessarily cut down.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your paper savings. This helps to achieve well-preserved forests and more natural spaces.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your paper savings. This falls short of what is necessary to achieve well-preserved forests and more natural spaces.

18. In an average month, how many of your meals include organic foods?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your consumption of mass-farmed goods. This prevents unnecessary usage of artificial chemicals and nitrogen fertilizers involved in mass-farming.
Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your consumption of mass-farmed goods. This allows more artificial chemicals and nitrogen fertilizers to be used by the mass-farming process.
Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your consumption of organic foods. This helps to achieve clean air and soil in the spaces where living things thrive.
Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your consumption of organic foods. This falls short of what is necessary to achieve clean air and soil in the spaces where living things thrive.
19. In the past month, how many times have you thrown away food?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your food waste. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your food waste. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your savings when it comes to food. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your savings when it comes to food. This falls short of what is necessary to achieve a healthy air quality.

20. In an average month, how many loads of laundry do you wash in cold water instead of warm or hot water? (Enter "0" if you NEVER do the laundry)

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.

21. In an average month, how many times do you clean your dryer's lint trap before drying a load of laundry?

Loss-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of minimizing your usage of electricity. This prevents unnecessary emissions from entering the atmosphere and air we breathe.

Loss-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of minimizing your usage of electricity. This allows unnecessary emissions to enter the atmosphere and air we breathe.

Gain-Framed Praise: Well Done! Your response indicates that you are currently doing a good job of maximizing your electricity savings. This helps to achieve a healthy air quality.

Gain-Framed Reproach: Ouch! Your response indicates that you are currently doing a poor job of maximizing your electricity savings. This falls short of what is necessary to achieve a healthy air quality.