The Relationships between Motivation, Goals, and Sanctions in Determining Levels of Cooperation over Diminishing Resources

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Legend

ANOVA – Analysis of Variance

CSS – Centralized Sanction System

DSS – Decentralized Sanction System

DV – Dependent Variable

IV – Independent Variable

LGLT – Little Gull Lake Task

MTES – Motivation Toward the Environment Scale

NSD – Non-Self-Determined

PCA – Principal Components Analysis

PEB – Proenvironmental Behaviour

RD – Resource Dilemma

SD – Self-Determined

SDT – Self-Determination Theory

SVO – Social Value Orientation

Abstract

Environmental degradation and biodiversity loss are worldwide problems caused by human activities, which can often be classified as a resource dilemma. This thesis examines one of the more studied interventions in social dilemmas for increasing cooperative behaviour, namely sanctioning systems, in conjunction with one of the least studied factors in this area, i.e., intraindividual motivation and goals. Across three studies, and using Self-Determination Theory (SDT) as a framework, this thesis examines the relationships between motivation, goals, sanctioning systems and proenvironmental behaviour (PEB) in a resource dilemma (RD). The resource dilemma used in this thesis was a virtual, iterated, 2-person partnered design where each participant was required to make decisions about recreational fishing harvests in a small, private lake with an inferred partner. The 'partner' was not real, but was simulated by the program in order to maximize experimental control. Study 1 used mediational analysis to demonstrate that quality of motivation will affect goal content, and goal content will predict proenvironmental behaviour in an RD. Study 2 introduced a centralized sanctioning system to the RD, and found that this type of sanctioning system increased PEB in the RD when added, and decreased PEB when removed, concomitantly affecting the quality of participant motivation. Study 3 introduced a decentralized sanction system to the RD concomitant with pre-written communication for/against the inferred partner. Results demonstrated that self-determined motivation positively predicted the use of positive feedback messages, and negatively predicted the use of monetary sanctions. The results of this thesis expand upon SDT, and point to the potential importance of thorough examinations into the relationship between motivation and cooperation in RDs, and the importance of intraindividual factors in RD research. Moreover, it highlights the potential benefits and drawbacks of relying on sanctioning systems to increase PEBs in RDs.

Résumé

La dégradation de l'environnement et la perte de biodiversité sont des problèmes planétaires causés par l'activité humaine qui peuvent être caractérisés comme des dilemmes de ressources (DR). A l'aide de la théorie de l'autodétermination (TAD) et dans le contexte de trois études, cette thèse étudie les relations entre la motivation, les buts, les systèmes de sanction et les comportements pro-environnementaux (CPE) dans un DR virtuel qui impliquait une association entre deux partenaires. Chaque participant était tenu de prendre des décisions quant aux récoltes de pêche récréative dans un petit lac privé avec un partenaire simulé par un programme dans le but de maximiser le contrôle expérimental. Dans l'étude 1, une analyse de médiation a été utilisée afin de démontrer que la qualité de la motivation affecterait le contenu de l'objectif et qu'à son tour, le contenu de l'objectif permettrait de prédire les CPE dans un DR. Dans l'étude 2, l'introduction d'un système de sanction centralisé au DR a permis de constater que ce type de système faisait augmenter les CPE dans le DR lorsqu'ajouté et faisait diminuer les CPE lorsqu'enlevé, affectant de façon concomitante la qualité de la motivation des participants. Dans l'étude 3, un système de sanction décentralisé au DR en concomitance avec une communication pré-écrite pour/contre du partenaire inféré a été introduit. Les résultats ont démontré que la motivation autodéterminée prédisait positivement l'utilisation de messages de rétroaction positive et négativement l'utilisation de sanctions monétaires. Les résultats développent sur la TAD et soulignent l'importance potentielle d'étudier de façon rigoureuse la relation entre la motivation et la coopération dans les DR, ainsi que l'importance des facteurs intra-individuels dans les DR. En outre, les résultats mettre en évidence les avantages et les inconvénients potentiels de se fier aux systèmes de sanction pour augmenter les CPE dans les DR.

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Chapter 1

General Introduction

This thesis contains three chapters. Chapter 1 is the general introduction, in which the background literature pertaining to all the studies included in this thesis is outlined in full, and the general overview of the objectives of the thesis as a whole are described. Chapter 2 contains the pilot study and three main studies of the thesis research line. Lastly, Chapter 3 contains a general discussion section synthesizing the results from all three studies, exploring the implications these findings may have on the extant literature in resource dilemmas, as well as the Self-Determination Theory on which the hypotheses were built, identifying weaknesses in the current research, and making recommendations for future research.

Environmental Degradation and Resource Dilemmas

Environmental pollution and destruction are serious problems on multiple levels. To begin with, environmental pollution poses a serious health risk for human populations, especially those in dense urban environments. Studies have shown that long-term exposure to air pollutants from combustion emissions is associated with increased mortality rates from cardiovascular and respiratory diseases (Crouse et al., 2015; Hoek et al., 2013). Environmental destruction and pollution affect older populations as well as infants and children more heavily with respect to increased health risks; and, in addition to the human realm, can have disastrous consequences for the biosphere with respect to extinction rates and biodiversity loss (Brook, Sodhi, & Bradshaw, 2008; Krauss et al., 2010; Santos de Araujo et al., 2014). It is well known that environmental degradation and destruction is largely wrought by human endeavours and the choices that people make (Winter, 2000). Therefore, it is of high importance that we understand the factors that promote people to act in more sustainable and proenvironmental ways. One of the promising ways to be able to accomplish this is to examine factors that impede or encourage cooperative, sustainable behaviour in a form of social dilemma known as a *resource dilemma*.

Resource dilemmas fall under the umbrella of 'social dilemmas'. As a broader term, a social dilemma is "any situation in which a person must make a choice between two outcomes, one that serves the individual well but has some cost for others, and another that is better for others but not as good for the individual" (Osbaldiston & Sheldon, 2002, p.37). For example, with respect to the task employed across all studies in this thesis, participants must choose between reaping large harvests of fish in each round of the task for personal profit at the expense of the profit of their partner, their own personal long-term earnings, and the health of the resource, or to reap smaller harvests each round, thereby leaving more fish for their future selves, for their partner, and for the sake of the health of the resource itself. The definition provided by Osbaldiston and Sheldon traditionally describes what's called a 'social trap'. In addition to social traps, there are two other types of traps (these are not necessarily mutually exclusive, either): temporal traps and spatial traps. In a temporal trap, "individuals choose short-term benefits at the immediate expense not of others in the group, but rather, of their own future selves", while in a spatial trap "people in a certain location may benefit while those who are in a different location suffer" (Osbaldiston & Sheldon, 2002, pp.39-40). An example of a temporal trap is the use of chemical fertilizers, as this will mean larger harvests in the short-term for those that use them, but will lead to a degraded ability of the soil in the long-run to be able to retain proper and essential nutrients, leading to an increased reliance on chemical fertilizers in the future (and cyclically exacerbating the problem). An example of a spatial trap would be the purchasing of non-fair-trade, non-organic coffee, which may mean cheap coffee for the consumer, but comes at the cost has of the producer in a developing nation instead.

In addition to the three types of 'traps', there are three subtypes of social dilemmas: prisoner's dilemma, public goods dilemma and resource dilemma. In a prisoner's dilemma, two or more individuals are taken 'into custody', so to speak, for a shared crime, and must make a

decision about whether to defect against their fellow inmates and confess to their involvement in the crime, leading to group loss and individual gains (usually through some reward structure for defecting), or to keep quiet about the crime in order to protect the other group members, leading to individual loss but collective gain (e.g., Khadjavi & Lange, 2013). The second type of social dilemma is the public goods dilemma, in which "people decide how much to contribute to the installment, maintenance, or improvement of a public good, such as paying for public transportation, contributing to a group project [or financial pool], or engaging in teamwork" (Balliet, Mulder & Van Lange, 2011, p.595).

Of particular interest to environmental psychologists is the subtype of social dilemmas referred to as 'resource dilemmas'. A resource dilemma is any situation in which people choose how much of a shared, finite resource that they will take for their own personal gains, and how much they will leave for the collective good, both in a spatial and a temporal sense (Balliet, Mulder & Van Lange, 2011). In this type of dilemma, "it is in each individual's interest to take as much as possible from the resource, but if everyone does this, then the resource becomes depleted and everyone is worse off, relative to a self-restrained and sustainable harvesting approach" (Balliet, 2010, p.41). A common phrase in referring to this type of dilemma is the "tragedy of the commons", and as such, another name for a resource dilemma is a 'commons dilemma'.

Resource dilemmas provide a rich framework by which to study environmental problems, as many examples of environmental destruction and degradation can fall under the umbrella of resource dilemmas. One such example is the fishing industry. Fishing, both commercially and recreationally, is a worldwide phenomenon that can have disastrous consequences on marine ecosystems if not done in a sustainable fashion. Within the fishing industry, companies and

individuals alike all share the finite resource of fish populations, and must choose between large personal harvests, or smaller more sustainable harvests, therefore falling under the category of a resource dilemma. When fisheries, for example, over-harvest – which is precisely what has been occurring since the 1980's – the problems that arise are catastrophic enough that marine ecosystems cannot be expected to compensate (e.g., Pauly et al., 2002). Moreover, determining the appropriate course for a sustainable future can be difficult given that many fisheries underreport their total harvests, leading to misinformation about the total impact of marine fisheries on respective ecosystems (Zeller, Rossing, Harper, Persson, Booth & Pauly, 2011). Concerns for sustainability surrounding the fishing industry are quite justified, given that the primary production rates of fished species does not match the consumption rate (Pauly & Christensen, 1995).

Overfishing can lead to the collapse of entire species (Lloret, Zaragoza, Caballero & Riera, 2008); and, as no species exists in a vacuum within the intricate web of relationships that comprise any given ecosystem, the collapse of a species of fish will have a ripple effect on the stability of other species within that ecosystem, sometimes equally as disastrous (McPhee, Leadbitter & Skilleter, 2002). While it is fairly well known that commercial fishing is responsible for the depletion of several species of fish around the world (e.g., Pauly et al., 2002), and while commercial fishing is traditionally the focus of environmental legislation and regulation, recreational fishing is often overlooked as a responsible agent of environmental degradation across the globe, and is largely unregulated in many countries (McPhee et al., 2002; Lloret et al., 2008; Ruddle & Segi, 2006). However, recreational fishing can have a fairly profound impact, and regulation of only commercial fishing by itself is recognized to be insufficient in managing fish populations (McPhee et al., 2002). One study of recreational fishing in the Mediterranean found that recreational anglers spend an average total of 4.1 hours

per day, 8.13 days per month, 5.78 months per year fishing, summing to an average of 193 hours per year per person spent fishing (Lloret et al., 2008). Moreover, recreational fishing as an activity is open-access, meaning there is no limit on the amount of people that can participate in the activity (McPhee et al., 2002). In Australia alone, the approximate harvest taken by recreational anglers per annum is estimated to be 50,000 tonnes of fish (McPhee et al., 2002). Moreover, the effects of recreational fishing on marine ecosystems extends beyond just raw harvesting, as this common and worldwide activity has been shown to have consequences echoing out in such areas as bait species, turtles, mammals and shorebirds, as well as associated pollution in the physical environment through the increased use of motor boats (McPhee et al., 2002). Thus, recreational fishing provides a strong example of a resource dilemma, and demonstrates the severity of the consequences of what can happen when a shared natural resource is not managed properly.

Within resource dilemma research, there is a wide range of different factors that have been investigated with respect to how they affect a person's propensity to either act competitively (taking more for themselves and leaving less for others) or cooperatively (leaving more for others and for the health of resource, while taking less for themselves). The factors that have been investigated thus far include: replenishment rate (e.g., Pavitt, McFeeters, Towey & Zingerman 2006), neurochemical depletion and its relation to social orientation (Bilderbeck et al., 2014), environmental uncertainty (Hine & Gifford, 1996; Kwaadsteniet, van Dijk, Wit & De Cremer, 2010; Roch & Samuelson, 1997), warnings about resource depletion (Joireman, Posey, Truelove & Parks, 2009), anger and retribution (Van Kleef, van Dijk, Steinel, Harinck & van Beest, 2008), proenvironmental values in relation to group member greed (Sussman, Lavalee & Gifford, 2016), nature immersion versus viewing urban scenes (Zelenski, Dopko & Capaldi, 2015), type of justification for unsustainable behaviour (Chen & Gifford, 2015), levels of

interdependence in exchange networks (Dijkstra & Van Assen, 2008), leadership type (e.g., Pavitt, High, Tressler & Winslow, 2007), culture (Parks & Vu, 1994), personality (Koole, Jager, van den Berg, Vlek & Hofstee, 2001), framing of responsibility (van Dijk & Wilke, 1997), dispositional greed (Seuntjens, Zeelenberg, van de Ven & Breugelmans, 2015), gratitude and goal contagion (Jia, Tong & Neng Lee, 2014), the effects of sanctions (Balliet et al., 2011; Mulder, van Dijk, De Cremer & Wilke, 2006), availability of communication (Balliet, 2010; Kerr & Kaufman-Gilliland, 1994), and trust (Balliet & Van Lange, 2013; Chen, Pillutla & Yao, 2009; De Cremer, Snyder & Dewitte, 2001; Mulder et al., 2006).

While the list of the various factors influencing behaviour in resource dilemmas is quite varied and rich, the tendency of researchers is to focus on the parameters of the task, or interpersonal influences on behaviour. In other words, what this body of research has uncovered, essentially, is how people will react to different circumstances of the task and/or group with respect to their choices to act competitively or cooperatively in the resource dilemma, or how parameters of the dilemma influence the way people will behave toward each others, e.g., the use and magnitude of monetary sanctions. Cooperation is often a group-level variable, where the mean harvest is aggregated across groups of 2 or more people, and groups in different conditions are compared and discussed. This work has been quite valuable, without question, but it has ignored one intraindividual factor that is known to affect behaviour in a wide variety of domains, including proenvironmental behaviours (e.g., Pelletier, Baxter & Huta, 2011; Sheldon & McGregor, 2000), that is, motivation. As Sheldon and McGregor (2000) point out, “relatively little work has been conducted on the influence of individual- or personality-level variables upon commons behavior” (p.384), and motivation is potentially an important construct to consider when examining individual-level variables in social dilemmas. While previous research has tended to focus on participants as *reactively* choosing their behaviour according to changes in the

parameters of the dilemma or the behaviours of others, or justifying their behaviour after the fact, research on participants' intraindividual motivation has the potential to uncover how people *proactively* pursue an activity, what their goals are in the dilemma, and how strongly and accurately these goals will determine their behavioural choices.

With respect to this, Self-Determination Theory (SDT) can help to guide research in resource dilemmas with respect to the influence of individual motivation. The overall aim of this research is to examine the influence of individual motivation (as defined by SDT) on the determination of intrinsic (e.g., improving health and well-being) versus extrinsic (e.g., making or saving money, power and prestige) goal content, and how motivation and goals relate to proenvironmental behaviour (i.e., more sustainable harvesting practices) in a resource dilemma. Moreover, this research will also examine how these relationships may change in the presence of a centralized sanctioning system, and how they may be related to how one attempts to influence one's partner in a decentralized sanctioning system. A centralized sanctioning system is a systemized administration of monetary incentives that are doled out by a central governing apparatus based on a priori criteria (i.e., by a government, or in the case of a resource dilemma, then by the program itself). A decentralized sanction system is a means by which participants can administer sanctions to one another based on their own criteria. In the case of a centralized sanctioning system, the purpose of this research is to examine the potential positive and negative impact(s) that the presence of external pressures and incentives may have on individual motivation and goals, and how these may translate into behavioural changes with respect to proenvironmental behaviour within the dilemma. With respect to a decentralized sanctioning system, the purpose of this research is to examine whether individual motivation may be related to the way(s) in which participants may use sanctions and/or communication in order to influence their partner in the dilemma. The tenets of SDT are oppositional to the predominant

assumptions underlying the use of centralized sanctions, but also offer insight into the relationship between motivation and interpersonal behaviours in a decentralized system, making it an ideal candidate for guiding hypothesis testing in this area of research. Firstly, an explanation of Self-Determination Theory will be given, followed by a discussion of research on sanctioning systems and communication in social dilemmas, and then a summary of the objectives of the present thesis.

Self-Determination Theory and Proenvironmental Behaviours

SDT (Deci & Ryan, 2000; 2012) is an organismic, humanistic theory of motivation that posits that human beings can internalize the motivation for important activities, and that this motivation falls on a continuum of non-self-determination/self-determination. This continuum contains six motivational subtypes (otherwise called behavioural regulations, as a synonymous term). Ranging from the non-self-determined to the fully self-determined (Deci & Ryan, 2000), the subtypes are: *amotivation* (to perform a behaviour without awareness of the reason for the behaviour or its outcome), *external regulation* (to perform a behaviour in order to obtain tangible or social rewards, to avoid punishments, or because of social pressure), *introjection* (to perform a behaviour in order to avoid the feelings of shame or guilt that would occur if the behaviour were otherwise not performed), *identified regulation* (to perform a behaviour because it is in line with your goals and value system to do so, or because the outcome of the behaviour is something that is valued), *integrated regulation* (to perform a behaviour because it is a part of who you are as a person to do so, that is, because performing the behaviour is a part of your identity), and lastly, *intrinsic motivation* (to perform a behaviour purely for the intrinsic experience of the behaviour itself). For research purposes, the subtypes of amotivation, external regulation, and introjected regulation are often grouped together to form a 'non self-determined' motivation index, while the

subtypes of identified, integrated, and intrinsic motivation are grouped together to form a 'self-determined' motivation index (e.g., Vansteenkiste, Sierens, Soenens, Luyckx & Lens, 2009). Motivation as defined by SDT can also be measured at either the trait or the state level, depending on the way in which it is measured and treated in a given study. On the one hand, motivation is generally treated a state-level concept, a variable that examines a person's motivation toward a given activity or domain of activities that can change across time and context. However, motivation can also be measured as a trait-level variable, which examines a person's general sense of self-determination towards their overall lives, and which is considered relatively stable across time, context and behavioural domain (e.g., Kopp & Zimmer-Gembeck, 2011; Pelletier & Dion, 2007).

The results of self-determined motivation are multifaceted, improving psychological well-being and development, as well as behavioural performance (e.g., more pro-environmental behaviours and more diversified behaviours; Pelletier & Aitken, 2014; Pelletier, Baxter, & Huta, 2011; Pelletier, Green-Demers & Béland, 1997; Pelletier, Tuson, Green-Demers, Noels & Beaton, 1998). With respect to environmental outcomes of motivation, such as proenvironmental behaviours, previous research has shown that the more self-determined forms of motivation (identified, integrated and intrinsic) are related to a higher frequency of performance of proenvironmental behaviours (PEBs), performing more difficult PEBs, a higher sustenance of performing PEBs over time, and persistence in performing PEBs in the face of obstacles (Green-Demers, Pelletier & Ménard, 1997; Pelletier, Baxter & Huta, 2011; Séguin, Pelletier & Hunsley, 1999).

In the past, the bulk of research examining motivation in social dilemmas has focused on Social Value Orientation (SVO). SVO breaks people down into two categories: proselfs and

prosocials. Generally speaking, and in the context of social dilemmas, proselfs are people who try to outperform others and to reap larger personal benefits, while prosocials are people who try to maximize collective gains and equal outcomes (Emonds, Declerck, Boone, Vandervliet & Parizel, 2011). According to a review by Bogaert, Boone and Declerck (2008), proselfs generally are less cooperative than prosocials. Of course, this research has helpful utility, but it also has some criticisms. Chief among these would be the redundancy of the conceptualization of motivation with respect to the outcomes of the social dilemma. Put another way, "there is substantial redundancy between Social Value types…and the behavioural outcomes studied (i.e., cooperation or competition within "real" social dilemmas), leading to a concern about what has been learned through the typology's application" (Sheldon & McGregor, 2000, p.385). Another shortcoming is that a person's orientation, according to this perspective, represents a stable personality trait (Emonds et al., 2011), and as such the provision of interventions that can alter a person to become more cooperative by changing their SVO becomes more difficult, whereas motivation is generally considered more state-based, and therefore is more malleable.

Other research has made similar classifications, such as motives for altruism, co-operativeness, individualism and competitiveness (e.g., Markoczy, 2004). In this case, "altruism means aiming to maximize the pay-offs of others. Co-operativeness means aiming to maximize joint pay-offs, competitiveness means attempting to maximize the difference between your own gains and others', and individualism means attempting to maximize one's own gains irrespective of others" (Markoczy, 2004, p.1023). Again, this research is certainly not without its merit; however, these constructs may have somewhat blurred the idea of a person's goals with a person's motivation, or to put it differently, it may have confounded the reasons *why* a person performs a given behaviour, with *what* they are performing the behaviour for. For example, the reason why a person may be recycling is because, overall, they identify with the values

surrounding environmentalism (i.e., they believe it is important to protect the environment), while the goal of their recycling is specifically to reduce their impact on landfills.

The types of motivation proffered by SDT are more extensive than previous conceptualizations of motivation in past research on resource dilemmas, and more easily distinguished from the desired outcomes of the task. Thus, SDT may be able to help advance the understanding of motivation with respect to behaviour in resource dilemmas by (1) giving a wider variety of motivations for being proenvironmental, (2) more clearly separating motivation from goals, and (3) potentially adding more concrete, research-based interventions on how motivation can be changed in order to increase cooperation in resource dilemmas.

With respect to the blurring of motivation and goals in past research, SDT can provide a clearer distinction between the two constructs. That is, "SDT differentiates the content of goals or outcomes and the regulatory processes through which the outcomes are pursued, making different predictions for different contents and for different processes" (Deci & Ryan, 2000, p.227). For example, imagine a person who is engaged in cleaning a public park (a public goods dilemma). This person's *motivation* for cleaning the park could be because performing proenvironmental behaviours (in this case, contributing to cleaner parks) is a part of their self-concept, or identity (i.e., they consider themselves to be an environmentally friendly person). However, their *goal* for cleaning the park could be to make it a better place for neighborhood children to be able to play and experience nature. It is not that the two are unconnected, as more self-determined forms of motivation tend to lead to more intrinsic goals, whereas non-self-determined motivational subtypes are more associated with extrinsic goals. That is, "when people value intrinsic aspirations, they also tend to be more autonomous in pursuing them, whereas there is a tendency for people to be controlled in their pursuit of extrinsic aspirations"

(Deci & Ryan, 2000, p.245). However, people could also feel pressure to pursue an intrinsic goal or they could choose to pursue an extrinsic goal. Nevertheless, a clear, conceptual distinction between the two will help to further research in this particular area. Motivation is more general and abstract, whereas goals are more concrete, specific, and proximal.

The closest approximation to a study examining self-determined/non-self-determined motivation and its relation to behaviour in a resource dilemma is an article by Sheldon and McGregor (2000), which examined the relationship between Extrinsic Value Orientation and sustainable behaviour in a resource dilemma across two studies. From the results of both studies, it was found that people who have extrinsic value orientations (wealth, fame, etc.) are more likely to act selfishly and unsustainably in a resource dilemma, reaping large personal harvests in the short run and leaving little for others or future generations.

Self-Determination Theory and Incentives

As previously mentioned, extrinsic incentives used to encourage or discourage wanted or unwanted behaviour respectively are generally seen in SDT as controlling factors that undermine internalization of behaviour (by keeping the source of motivation external), thereby reducing self-determined motivation and encouraging non-self-determined motivation. External, or extrinsic, incentives can be broken into two basic categories, punishments and rewards. With respect to punishments, these are ubiquitously controlling in their nature, and subvert the internalization of the motivation for a given activity, leading to greater non-self-determined motivation. However, with respect to rewards, the effects of such can be somewhat more nuanced (see Deci, Koestner & Ryan, 1999). According to SDT, the effect of rewards depends on their functional significance, meaning the effect is dependent on the interpretation that one's self-determination (i.e., their perceived autonomy) and competence is affected by the reception

of the reward. Rewards can be interpreted as controlling, and as such can undermine feelings of autonomy and have a negative impact on intrinsic motivation, or as informational, giving positive feedback to the receiver on their performance and, in this way, enhancing feelings of competence. This interpretation (i.e., the functional significance) can depend on the interpersonal context, such that if the context is pressuring, it will lead to decreased intrinsic motivation, while if the context is non-controlling, then the provision of rewards can be informational and possibly even lead to increased intrinsic motivation. The theory differentiates between multiple types of rewards: task non-contingent rewards (which are controlling and non-informational), task-contingent rewards (which are controlling and slightly informational), and performance-contingent rewards (which are the most controlling, but also the most informational). Task-contingent rewards can be further broken down into engagement-contingent and completion-contingent. Moreover, the effects of verbal rewards, which are essentially instances of positive feedback, are similarly dependent on the interpersonal context in which they are administered.

The results of a meta-analysis by Deci, Koestner and Ryan (1999) demonstrated several effects of rewards on intrinsic motivation and self-reported interest in an examination of 128 controlled laboratory experiments. To begin with, verbal rewards tend to enhance intrinsic motivation and interest (though the former only occurs in college student samples, and not children). With respect to tangible rewards, unexpected tangible rewards have no effect, while expected tangible rewards reduce intrinsic motivation. Similarly, task non-contingent rewards have no effect, while both engagement-contingent and completion-contingent rewards undermine intrinsic motivation and interest. Furthermore, performance-contingent rewards undermine intrinsic motivation, except in 3 studies wherein rewards were administered for poor performance (i.e., were negative feedback) with a control group receiving equivalent negative

feedback, in which there was no effect of rewards on intrinsic motivation above and beyond the reduction on such caused negative feedback; in addition, performance-contingent rewards had no undermining effect on interest.

A later study by Houlfort, Koestner, Joussemet, Nantel-Vivier and Lekes (2002) found some slightly different results with respect to interpersonal context and the type of autonomy measured. In this study, it was found that, in a college student sample, participants in the performance-contingent rewards condition had decreased affective autonomy (feelings of pressure and control) and increased competence compared to a control group. However, decisional autonomy (feeling of amount of available behavioural options) was not affected. Moreover, these results did not depend on interpersonal context (informational vs. controlling). The results were mostly replicated in a second study using a sample of children, though the increased competence result was not corroborated by relevant post-hoc t-tests.

In summary, the effects of rewards on self-determined motivation and task interest, as well as perceived competence, can depend on the type and nature of the reward. Verbal rewards can actually be a positive force in internalizing motivation and increasing competence when given in an informational interpersonal context. However, tangible rewards tend to have a negative impact on intrinsic motivation and interest. While unexpected or task non-contingent rewards are essentially benign (neither enhancing nor hindering), expected rewards, task-contingent rewards, and especially performance-contingent rewards have a significant detrimental effect on intrinsic motivation and interest (though no negative effect on interest has been found for the performance-contingent rewards). However, the undermining effect of performance-contingent rewards is specific to affective autonomy, not decisional autonomy, and

this type of reward can also have the potential benefit of increasing perceived competence in the receiver by providing positive feedback about performance.

Self-Determination Theory and Interpersonal Behaviours

In addition to its application to proenvironmental behaviours, SDT has also been applied to interpersonal behaviours. That is, past research has shown that a person's own need satisfaction and the quality of motivation derived thereof can be predictive of how that person will, in turn, help to satisfy/thwart the need satisfaction of those around them. With respect to the educational domain, teachers that feel that their work environment is supportive of their need for autonomy tend to utilize a teaching style that is supportive of the autonomy of their students (Pelletier & Rocchi, 2016; Pelletier, Seguin-Levesque & Legault, 2002; Taylor, Ntoumanis & Standage, 2008). However, when teachers' need satisfaction is not met, resulting in non-self-determined motivation, it is predictive of the use of controlling teaching methods, such as a heavy emphasis on external incentives, such as grades (Soenens, Sierens, Vansteenkiste, Dochy & Goossens, 2012). These relationships can be found in the physical education domain as well. When extrinsic pressures such as time constraints and heavy emphasis on student assessments are prominent in a physical education teacher's environment, this has been shown to lead to lessened need satisfaction; in turn, this tends to lead to reliance on teaching strategies that are controlling and coercive (Taylor, Ntoumanis & Smith, 2009). Moreover, the same trend in relationships is found in parent-child interactions as well, as parents that are low on basic psychological need satisfaction tend to use more extrinsically oriented and controlling parenting practices (see Deci & Ryan, 2000).

While the above findings provide a solid foundation to guide hypothesis development, the relationship between intraindividual motivation and interpersonal behaviours in social

dilemmas has not been systematically investigated in the extant literature. Resource dilemmas are a somewhat unique interpersonal situation. Teacher-student and parent-child relationships, in essence, hinge on the differential statuses of the members of the dyads, as teachers and parents are always superordinate, while students and children are subordinate. In a resource dilemma, however, the dyadic relationship is more akin to a peer relationship, wherein both members are generally considered relatively equal. However, even when equating resource dilemmas to peer relationships, caution should be used, as a resource dilemma adds in a second dimension wherein the participating members are also choosing to compete or cooperate over a finite resource. While peers may play games together, or share toys or objects in a given activity, the nature of this sharing does not have the same connotations that the 'sharing' in a resource dilemma does. That is, if a soccer ball breaks because two people could not properly play together with it, it is only a broken ball; however, if a group of people cannot properly manage a natural resource, it can lead to sometimes catastrophic environmental destruction in the real world. This changes the nature of the relationship of interest, and opens up a new avenue of research in motivation and interpersonal behaviours. In this way, the application of SDT to resource dilemmas in which a decentralized sanction system is present can advance knowledge on both sides: for theories of human motivation and interpersonal behaviours, as well as our understanding of environmental problems and the human factors that exacerbate or ameliorate them.

While research in SDT has provided foundational evidence of the relationship between motivation and individual proenvironmental behaviours, as well as interpersonal behaviours in superordinate-subordinate relationships, research guiding the use of sanctioning systems, particularly centralized sanction systems tend to base their expectations off of economic, ego-incentive, rational-choice models. Contrary to the expectations of SDT, the economic models that guide much of the research in this area assume quite the opposite of what SDT would

predict: namely, that the motivation for all individuals in a social dilemma is self-interest, which can be manipulated through the payoff structure of the dilemma and the presence and absence of sanctions.

Sanctions in Resource Dilemmas

The presence or absence of sanctions and the corresponding effect on cooperation is a well-studied topic in social dilemmas, with almost all of the research in this area utilizing a public goods dilemma paradigm. A sanctioning system is a system of monetary punishment and/or reward that can be administered either centrally (by the task itself, automatically, and under preset conditions) or in a decentralized way (by the participants in the dilemma according to their own criteria). Almost ubiquitously, research on sanctioning systems in social dilemmas is guided by economics models in which is it assumed that, given appropriate payoff structures and incentive programs, a person can be guided to 100% cooperation or 0% cooperation. In other words, it is assumed that each individual will act selfishly according to his/her own gains, and will expect others to do the same (Jackson, 2008); and, as such, the real means of inducing cooperation is to make it in each person's best interests to contribute via appropriate punishment and reward systems.

Indeed, a comprehensive meta-analysis by Balliet, Mulder and Van Lange (2011) demonstrated that the presence of monetary punishments and rewards in a social dilemma does increase cooperation. Moreover, this relationship has shown to be strongest in decentralized sanction systems (Balliet et al., 2011). However, this increased sanction-cooperation relationship is only found in the punishment-cooperation link, meaning that punishments issued from one person to another (rather than from a program to a participant) are more potent in terms of the size of their effect on people's behaviour in a social dilemma. With respect to the reward-

cooperation link, no significant difference between centralized and decentralized sanctions has been found. In addition, sanctions are most effective when people believe that the intentions behind them are not driven by self-interest. With respect to centralized sanction systems, this is one of the larger drawbacks to their efficacy, as centralized power is generally seen by participants in social dilemmas as motivated by self-interest. With respect to decentralized sanctions, the positive effects of receiving sanctions is higher when participants share equal roles, and the administration of the sanctions is believed to be altruistic (Balliet et al., 2011). In either type of system, the common thread is that the positive impact of the presence of those systems on cooperative behaviour comes when participants believe they are administered based on a common concern for the collective outcome (Balliet et al., 2011).

One of the reasons for such a strong focus in the literature on this topic is the practical utility of the findings. In essence, the research seeks to understand how government lead financial incentives (such as subsidies, taxes or fines) might help to foster more proenvironmental behaviours (or eradicate unenvironmental ones) in its constituent citizens regarding shared natural resources, as most research tends to focus on centralized sanctioning systems. Research on decentralized sanctioning systems is generally applied to understanding how norm enforcement surrounding environmentally protective behaviours is spread within and across groups, cultures and societies. However, the large majority of this research focuses on the parameters of the dilemma, and how these effect, or are affected by the presence of a sanctioning system. For example, research has examined the impact of the different sizes of the punishments or rewards, whether they are administered centrally or decentrally, whether or not they are administered with or without cost to the individual (e.g., it costs a person $10 to fine someone $40), whether participants work with strangers for each dilemma or the same people, the number of trials within the dilemma, the payoff-structure, and group size (see Balliet et al., 2011). Thus,

there is quite a fair amount of research on the parameters of sanctions that can increase or decrease their efficacy in changing participants' behaviour in a social dilemma. However, not all of the research in this area has found that sanctions (particularly centralized sanctions) are necessarily a promotional force when it comes to sustainable cooperation, with some new research pointing to the potential for the presence of sanctioning systems to have a negative effect on participants' sense of trust, leading to diminished cooperation over time.

Potential Negative Effects of Centralized Sanctions

Research has begun to uncover that there are potential negative effects that come from using centralized sanctioning systems in social dilemmas. One of the first articles (if not the first) to examine the negative impact that sanctioning systems can have was conducted by Tenbrunsel and Messick (1999), in which the authors used a two-person, four-trial public goods dilemma asking participants to assume the role of a manager at a moderate-sized manufacturing plant. Participants were asked to make decisions about whether to conduct environmental business practices (such as cleaning of certain industrial parts, and conducting inspections to make sure that the plant was up to environmental code) at a cost to profits. The cumulative results of this study showed that the presence of a sanctioning system leads to decreased levels of cooperation, such that cooperation in the sanction condition was lower than cooperation in the no-sanction condition. Furthermore, the presence of a sanctioning system also lead to increased expectations that others in the dilemma would be non-cooperative. In addition, the results of their studies showed that the presence of a sanction system also changed the frame with which participants made their decisions, with 44.8% of participants in the no-sanction condition saying that the decision was a business one, and 80% selecting the business frame in the sanction condition.

Following these results, Mulder et al. (2006) sought to provide evidence that the implementation of a sanctioning system would have a longer-term, negative effect on cooperation through a reduction in participants' level of trust. The reasoning behind this was that the implementation of a sanctioning system sent an implicit message to all involved that the other people in the dilemma could not be trusted to cooperate on their own, and that they needed a system put in place to make sure that that they, at the very least, cooperated to a certain degree. In the authors' own words, "we argue that a sanctioning system may increase people's trust in others being externally motivated to cooperate, but that it does not increase trust in others being internally motivated to cooperate....By installing a sanctioning system, an authority might implicitly communicate that there is reason to doubt that group members will cooperate by themselves" (Mulder et al., 2006, p.148). Across three studies, the results converged to show that there was a significant decrease in trust for the sanction group compared to a non-sanction group; in addition, cooperation congruently decreased for the sanction group. Mediation analyses provided converging evidence that the loss in trust was a significant mediator between condition (sanction or no-sanction) and decreased cooperation in the dilemma. The overall summary across all three studies was that sanctioning systems undermine trust, and subsequently cooperation when those sanctions are removed, by reducing the belief that others are internally motivated to cooperate, and this holds true when subjects are divided based on dispositional trust, and when trust is experimentally manipulated.

Chen et al. (2009) endeavored to provide further evidence of potential negative outcomes of the use of sanctions in social dilemmas. Across two studies, the authors found that (1) cooperation that was induced by the presence of a sanctioning system was diminished when the sanctioning system was removed, (2) when the sanctioning system was removed, people behaved less cooperatively compared to the control group, (3) trust was lower in the sanction group after

the sanctioning system was removed compared to the control group, (4) trust was a significant mediator of the effect of removing the sanctioning system on subsequent cooperation, and lastly, (5) creating a moral appeal in the form of communication of the importance of cooperation and non-egoistic behaviour was more effective than sanctioning systems in encouraging sustained cooperation.

Decentralized Sanction Systems and their Potential Negative Effects

In general, a sanction system simply refers to a system of administration of (usually) monetary rewards and punishments to participants of a given dilemma. A decentralized sanction system, more specifically, refers to a sanction system in which participants are responsible for administering the sanctions to each other. A previous meta-analysis by Balliet et al. (2011) has shown that decentralized sanction systems do significantly improve cooperation in social dilemmas. This meta-analysis examined a large number of decentralized sanction system articles (N=102), and was comprised of systemic coverage of a range of moderators. Furthermore, the coverage was comprehensive enough that for each moderator, the individual effect on decentralized sanction systems (vs. centralized sanction systems) was examined, lending further strength to the analyses therein. However, the meta-analysis chose its moderators through the lens of a single theoretical approach (i.e., interdependence theory), which was taken from economic models of behaviour in social dilemmas. As such, the meta-analysis only examines moderators surrounding the parameters of the dilemma and the DSSs employed (e.g., group size, cost of incentive, type of incentive, number of iterations). Therefore, the meta-analysis does not include any psychological variables of interest that might have affected or been affected by the presence of a DSS (with the same strengths and weaknesses also applying to their coverage of centralized sanction systems as well).

The premise behind the use of decentralized sanction systems is generally norm salience and enforcement, whereby the administration of punishments to 'free-riders' (people who take more for themselves, and do not contribute to the group; punishing these types of participants is referred to as 'altruistic punishment') and/or rewards to altruists (people who leave/contribute more for others at the expense of their own personal gains) by members of the dilemma makes salient the expected norm of participants to act cooperatively in the dilemma, and demonstrates that this norm will be enforced.

While, overall, the effects of decentralized sanctions in the Balliet et al. meta-analysis were shown to be positive and significant, there are studies that demonstrate the potential negative effects of the presence of a decentralized sanction system in social dilemmas. One drawback found in the use of decentralized sanction systems is that it can create an 'anti-social' state. That is, once a person has received a punishment, they are more likely to engage in what is called 'anti-social punishment' (e.g., Chaudhuri, 2011). Anti-social punishment occurs when people who contribute less punish those who contribute more, often because of strategic considerations (anticipation by free-riders of upcoming punishments for their lack of contribution) or in order to get revenge for a previous punishment issued by another person (Chaudhuri, 2011). Indeed, a study by Nikiforakis (2008) showed that when anti-social punishment occurs, mean cooperation levels become lower than a control group, and show a decay over time (cooperation becomes less across each successive iterated round of the dilemma; see also Cinyabuguma, Page & Putterman, 2005; Denant-Boemont, Masclet & Noussair, 2007). In addition, the use of punishment in a decentralized sanction system can establish a controlling norm, which promotes further use of punishment in order to try and maintain cooperation (e.g., see Gurerk et al, 2006).

In the real world, this could work in a circular fashion (a positive feedback loop), spiralling down into a scenario in which cooperation surrounding a diminishing resource is based on fear of punishment, on extrinsic adherence to socially enforced norms, and on retributive action, rather than being based on a person's own volitional action derived from an intrinsic motivation to see the environment become more vital and healthy. An important question arising from the divergent findings of the Balliet et al. (2011) meta-analysis and the above-mentioned studies on anti-social punishment is: what factors predict (a) the use of punishments, and (b) the use of rewards in a decentralized sanction system in a resource dilemma? A better understanding of when and why participants will use different types of sanctions for or against one another can help to avoid the potential negative impacts that such a system can have on its constituents.

While the above mentioned research points to the potential positive and negative effects of the use of sanction systems, another area that has received strong empirical support from the literature in terms of factors influencing cooperative behaviour in social dilemmas is communication. As this will have relevance to the third study in this thesis in which a decentralized sanction system will be used (and in which participants will have the opportunity to attempt to communicate with their partner), a brief discussion of the effect of communication on performance in social dilemmas will be given.

Communication

Research has shown that communication can have a positive influence on rates of cooperation within social dilemmas. A meta-analysis by Balliet (2010) showed that, when examining the effect sizes of 45 studies, the overall effect of communication on cooperation in social dilemmas is positive and significant. While research has shown that the effect of communication on cooperation in social dilemmas is stronger for verbal communication relative

to written communication, and that communication has a marginally larger effect for bigger groups compared to smaller ones, it has also been shown that whether discussion happens before the dilemma or during does not have a significant effect on the relationship between communication and cooperation (Balliet, 2010). The positive benefits of communication on cooperation has been explained by past research via an increase in the expectation that others will cooperate, solidifying group identity, establishing norms to cooperate (Balliet, 2010) as well as establishing a social commitment to cooperate with other members involved in the dilemma (Kerr & Kaufman-Gilliland, 1994). However, very little, if any evidence exists within social dilemma research to discuss the role of (a) personal motivation (and the goals derived thereof) and its potential influence on participants' interpersonal behaviours, and (b) whether people will utilize sanctions or communication within the dilemma when they have a choice of either/or relative to their personal, task-related motivation and goals.

Overall Objectives of the Present Thesis

In summary, resource dilemmas provide a viable avenue by which researchers in environmental psychology can examine the factors that promote or inhibit people from sharing finite natural resources in a sustainable manner. In the past, research has put a strong focus on manipulating the parameters of the task or examining interpersonal factors within the dilemma (such as the presence or absence of a sanctioning system, if people can communicate within the dilemma, group size, and level of trust among participants). One intraindividual factor that has largely been missing in the research is the study of motivation, and, correspondingly, the goal content that different qualities of motivation can engender. In this, SDT provides a key candidate for hypothesis testing in this area as it (a) puts a clearer distinction between motivation and goals compared to previous conceptualizations used in the literature, (b) provides clearly

antithetical hypotheses to the underlying assumptions driving the use of sanctioning systems, making it an ideal candidate for comparative testing with respect to centralized sanctions, and (c) provides expectations about how individual motivation can translate into interpersonal behaviours in a decentralized sanction system. Moreover, by extending research on motivation as defined by SDT into the area of resource dilemmas through the investigations presented in this thesis, the knowledge-base on human motivation in general can be expanded, as SDT has yet to (a) be systematically applied to studying how motivation relates to sustainable behaviour in this type of scenario, and (b) how motivation is related to interpersonal behaviours in the unique social dynamic that can be found in resource dilemmas (peer-based cooperative/competitive relationships in which failure to operate functionally can have disastrous consequences on ecosystems).

With more specific respect to each study, Study 1 had the overall objective of providing the initial foundational evidence for the existence of significant relationships between individual motivation, goals, and proenvironmental behaviour in a resource dilemma. In Study 2, a centralized sanction system was added to the resource dilemma previously employed in Study 1, and the extent to which this system (i.e., when top-down pressure was applied to participants' behaviours) affected the relationships between motivation, goals and proenvironmental behaviour was examined, as well as new relationships between the inferences that participants made about their fake partner's goals and their own personal proenvironmental behaviour. In Study 3, a decentralized sanction system was introduced into the same resource dilemma in order to examine how individual motivation is related to interpersonal behaviours in a resource dilemma when participants are given (a) the ability to exert an influence over their partner in the dilemma and (b) a choice between the use of sanctions or pre-written communications as a means of influencing their partner. The purpose of such was to examine how intraindividual

motivation and goals may be related to how participants will attempt to exert an influence on their inferred partner (i.e., how participants may use bottom-up pressure or influence to adjust the behaviour of their inferred partner). In this way, the combination of all three studies will provide a more complete foundational picture of the relationships between motivation, goals, and proenvironmental behaviour in a resource dilemma and how these relationships may change in the face of both forms of sanctioning systems. Because this type of research has not been conducted before, it was important to examine the foundations of these relationships in both forms of sanctioning system in order to gain a fuller understanding of how intraindividual motivation plays a role in sanctioning systems. Moreover, they will provide more in-depth replication of the potential negative effects of sanctioning systems on relevant outcomes in a resource dilemma found in previous research, which did not take any measure of individual motivation as a DV in their studies. In addition, it will expand on previous knowledge on individual motivation by applying SDT into a new area of inquiry. In these ways, the research contained herein is meant to be at once both applied and fundamental in nature.

Chapter 2

Pilot Study and Main Studies (Study 1, Study 2, and Study 3)

Pilot Study

Before beginning the main line of experimentation that comprises the majority of this thesis, a pilot study on the Little Gull Lake Task (LGLT) was first conducted. The purpose of this pilot study was to ensure that the experimental task and the necessary deception involved in its methodology functioned appropriately; in addition, the pilot study was also meant as a preliminary test to determine if there were significant relationships between personal motivation, goals, and proenvironmental behaviour in a resource dilemma. Thus, any reference to the results or methods of the pilot study will refer to such as simply the pilot study, while reference to the main studies of this thesis will use references to Study 1, Study 2 and Study 3 for such respectively.

The hypotheses for the pilot study were simple. It was hypothesized that self-determined (SD) motivation would have a positive relationship with the intrinsic goal of returning as many fish to the lake as possible every round regardless of total earnings (*hypothesis 1*), and would have a negative relationship with extrinsic goals (i.e., to make more money than the other person, and to make the most money possible every round; *hypothesis 2a* and *2b*, respectively). Moreover, it was hypothesized that non-self-determined (NSD) motivation would have a negative relationship with having an intrinsic goal (*hypothesis 3*), but a positive relationship with extrinsic goals (*hypothesis 4a* and *4b*). Moreover, it was anticipated that having an intrinsic goal would be positively related to having a higher proportion of fish returned (*hypothesis 5a*), whereas pursuing extrinsic goal(s) (i.e., to make more money than the other person, and/or to make the most money possible every round) would be negatively related to such (*hypothesis 5b* and *5c*, respectively). Lastly, it was expected that SD motivation would be a significant positive

predictor of the proportion of fish returned to the lake by participants (*hypothesis 6a*), and that NSD would be a significant negative predictor of such (*hypothesis 6b*).

Method

Participants and Procedure

A sample of first-year university students from a Canadian university enrolled in an introductory psychology course participated in this lab-based study in exchange for a course credit (final sample size *N*=29). Mean age of participants was 20.1 years old (*SD*=5.25, range = 17-38). The majority of participants were female (n=21), with the number of male participants being less (n=5). Most participants were English-speaking (n=15) in terms of their identified language via the ISPR prescreen questions, with the rest of the participants speaking French (n=5) or other languages (n=6) as their primary language. There was missing data for the demographics for three participants.

Prospective participants were invited via the University of Ottawa ISPR to participate in a lab-based study titled "The Motivation for Resource Management", under the premise that they would be participating in conjunction with another participant in a partnered task. Upon entering the lab (which had three testing rooms, A, B,or C), the experimenter (Daniel Baxter) introduced himself to the participant and either told them that "we are still waiting for your partner to arrive, but we can go ahead and get started if you're ready" or "your partner has already arrived and is in the other room reading the consent form, so we can begin if you're ready", depending on whether the participant arrived somewhat early or late. The other participant, of course, did not actually exist, and the task would be done entirely with the program itself. The participant was then led into an experiment room, whereupon the experimenter gave a brief outline of the consent form and then left the participant alone in the experiment room in order to read and sign

under their own understanding and volition. When the consent form was signed, participants were then instructed as to how to properly fill out the Motivation Toward the Environment Scale, and were then left alone for approximately five to ten minutes in order to complete the questionnaire in privacy. Following this, participants were introduced to the experimental task with full explanations and instructions on the Little Gull Lake Task (LGLT), and were then given time to conduct 12 practice rounds on their own in order to get familiarized with the task. Participants were instructed that the data was not going to be saved or recorded for the practice trials, and that they would be doing them on their own (i.e., just with the computer). Care was taken to avoid the use of terms such as "against", "compete with", and "working together" when explaining the task and with whom (or what) the person would be performing the task (was just referred to as "doing the task with…"). This was done in order to eliminate implicit framing of the task as either competitive or cooperative, as it was up to the participant to decide for themselves how they would frame the task. Following the practice trials, participants were given a chance to ask any questions they had regarding the task, or any clarifications that may have been needed, before going any further. Once these were dealt with, the participant was told to wait while the experimenter went to check on the status of their 'partner'. This was done in order to improve the believability of the premise of the other participant's existence. Following this, the participant was instructed that they could begin the real trials, which would involve their partner and from which the data would be saved. Once the real trials of the task were completed, participants were asked to fill out a questionnaire relating to their goals during the practice trials and the real trials (same questions, but two separate sheets; see Measures section). After these were completed, participants were debriefed about the true nature of the experiment, and the experiment was concluded.

Experimental Task: the Little Gull Lake Task. The *Little Gull Lake Task* (LGLT) is a real-time, virtual microworld, iterative, partnered resource dilemma quite similar to Gifford's FISH task (Gifford & Gifford, 2000). However, the premise of the LGLT is not based on commercial fishing, but rather on recreational fishing, as we believed this would better tap into a person's own internal motivation by eliminating the influence of the necessity to earn money from the fish in order to earn a living. In addition, the LGLT was created for the purpose of this research in order to be able to introduce different forms of sanctioning systems into the resource dilemma in future experiments. Otherwise, the two tasks are fairly comparable, with the exception of these differences, as Gifford's FISH task has proven useful in previous research (e.g., Chen & Gifford, 2015; Sussman et al., 2016; Zelenski et al., 2015).

In the LGLT, participants were asked to put themselves into the following scenario:

"You have retired from a fairly successful career, and have decided to live a nice, quiet life on a lake called Little Gull Lake. Other than yourself, you have one other neighbor that lives on the other side of the lake. As part of your retirement, you really enjoy fishing, and so you go out fishing on the lake every day. Your neighbor also enjoys fishing, and also goes fishing every day; though, the lake is large enough that you will not be stepping on each others' toes, so to speak. Each round that you do will represent a month that you have been living on the lake with your neighbor. What you need to do is decide, of that fish that you caught that round, how many fish you would have been likely to keep, and how many fish you would have thrown back during this period. Each fish that you decide to keep, and you can keep as many or as little as you want, will be sold at a local market for $10 per fish. Each fish that you decide to throw back, and you can throw back as many or as little as you want, will add back to the population of fish left in the lake to be fished for another day. The task will last upwards of 48 rounds, or, if the number of

fish in the lake becomes zero, then the task will end at that point as well. Also, the task will go for a maximum of 10 minutes, at which point it will end as well. This isn't meant to make you feel pressured to make snappy decisions. In fact, I want you to take as long as you need to make any and all decisions during the task. The time limit and the cap on the number of rounds is simply there so that the task does not carry on indefinitely.

"In this field, you will put in the number of fish that you want to throw back. Of course, the number of fish you want to keep will be a matter of simple arithmetic: the number of fish you caught minus the number of fish that you want to throw back. After each round, the number of fish in the lake will replenish itself by a small amount, in addition to the fish you and your neighbor decide to throw back, in order to simulate the real world in which fish would migrate and reproduce. However, once the number of fish in the lake reaches a thousand fish, then the replenishment rate will become 0, and the number of fish in the lake will only go up by the number of fish you and your neighbor decide to throw back on any given round until the population drops below a thousand again. In between making your decisions, you will see a screen that says 'waiting for the other participant". This is just because you are either physically waiting for your partner to make their decision, or the program needs a few seconds to calibrate your responses and to refresh the visual output that you see here. Once you are done, you will see a screen that says "Finished! Saving Data". You can leave it at that screen, and that's when you'll come and let me know that you're finished."

On the interface for the LGLT (see Figure 1), participants were able to see multiple pieces of information, including: how many fish they caught that round, how many fish their 'neighbor' caught that round, what round they were on, how many fish were left in the lake, how much money they have made cumulatively off the fish they decided to keep, and how much

Figure 1 Screenshot of the Little Gull Lake Interface

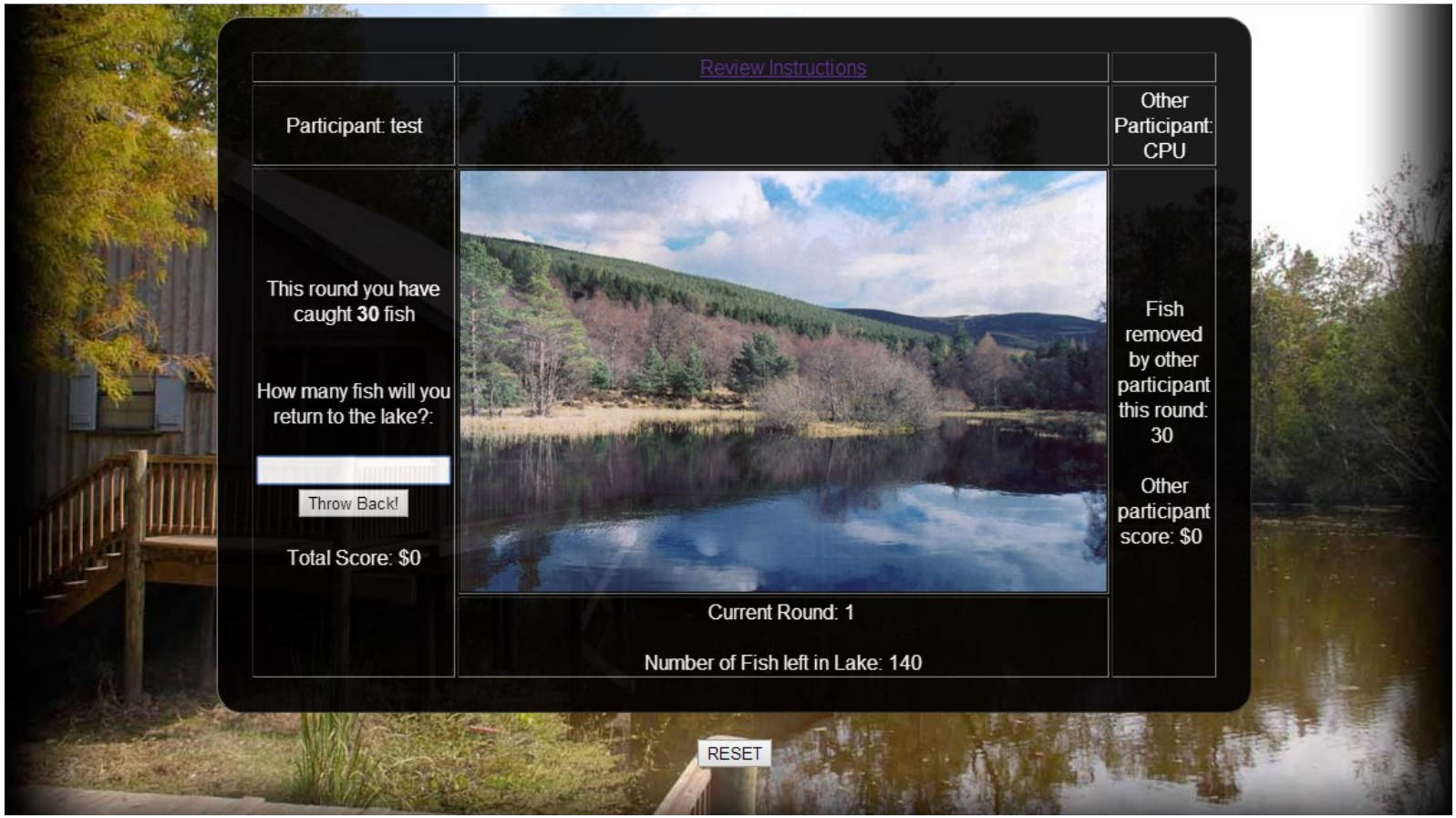

Figure 1. Screenshot of the LGLT interface that will be visible to participants (screenshot is for the starting round of the 'practice trials'). Interface includes information on how many fish are currently in the lake, the current round, current total income for both participant and 'partner', number of fish caught this round by both the participant and the 'partner' and a blank field in which participants can input the number of fish they'd like to throw back into the lake each round. A 'Review Instructions" hyperlink was always present at the top of the screen so that participant could consult the premise of the task as well as the instructions previously given by the experimenter.

money their neighbor had made so far as well. They were instructed that their partner would be able to see the same information about them as they could see about their partner.

Several aspects of the behaviour of the fake partner were controlled in order to make the premise of their existence more believable, and also in order to eliminate influence that their behaviour may have on the behaviour of the actual participant. In order to make the behaviour of the fake partner feel more organic to the participant, the program was instructed to have varying decision times. That is, the program would randomly draw from between 1, 2 or 3 seconds for the decision time for the fake partner, manifested as the length of time the "waiting for other participant…" screen discussed above would appear in between rounds. Also, the fake partner would throw back varying amounts of fish each round, rather than a fixed amount, in order to further increase the organic feel of their behaviour. Thus, the fake partner would throw back between 60% to 73% (18 to 22 out of 30 fish) of the fish that they caught on each round. This would average out to 20 fish thrown back by the fake partner on each round. This was done not only to improve the organic feel of the fake partner's behaviour, but also in order to ensure that the goals of the participant were not thwarted by the fake partner. That is, if a person was trying to act sustainably, but the fake partner was throwing back too few fish in order for this to occur, then a participant who otherwise would have been acting sustainably might be pushed to act unsustainably because the perceived efficacy of their behaviour was reduced by the behaviour of the fake partner (e.g., see Kerr & Kaufman-Gilliland, 1997). Also, if a participant was motivated to try to earn more money than the fake partner, then because of the number of fish being thrown back on average by the fake partner, the participant would need to act unsustainably in order to compete for the highest income. Thus, the number of fish thrown back by the fake partner was constrained in such a way that it would appear more organic, would not thwart the goals of

people who wanted to act sustainably, but would also provide a threshold past which it would be unsustainable to compete for higher income.

The program was constrained in other ways in order to improve the interpretability of the data derived from the task. The program was constrained to draw 30 fish per round for both the participant and the fake partner; and, in this way, the number of fish thrown back on each round would be a more meaningful number than if there was a random number of fish drawn on every round (i.e., knowing the participant threw back 17 fish on a given round would be meaningful because we would know it was out of 30 fish). This constraint would occur as long as there were 60 or more fish left in the lake (i.e., enough fish to divide 30 fish evenly to both the participant and the fake partner); if there were less than 60 fish, then the program simply divided the number of fish left between the participant and the fake partner. The program always started with 200 fish, though practically speaking the starting resource pool was 140, as on the first round both the participant and the fake partner would draw 30 fish each (200 – 60 = 140). There was also a cap on the maximum number of fish that could be in the lake (max number of fish = 1000), that was implemented part-way through testing of the pilot study, which was initiated because it was found that some participants, who wanted to see the population of fish rise as high as they could get it, would see the number of fish get as high as 1500 fish or more (because of the replenishment rate being a percentage). At this point, they would start keeping all the fish they caught simply to bring the population back down to more reasonable levels. This would skew the average number of fish kept and returned from what it would otherwise have been, and so a cap on the maximum number of fish was installed into the program. The replenishment rate for the fish population was set at 15% of the total number of fish left in the lake after the participant and the fake partner had thrown back their fish. There was also a 'final threshold' of fish put into the program in order to keep it from going on indefinitely, which was set to 15. At this point, if the

participants' take was fewer than this number of fish, then instead of throwing the fish back, the program harvests everything left (i.e., ends) in order to prevent the task from going on forever with low populations.

Measures

Motivation Toward Environmental Behaviours. Participants' motivation to perform PEBs was assessed using the Motivation Toward the Environment Scale (MTES; Pelletier et al., 1998; see Appendix A), which has been validated in previous studies (see also Villacorta et al., 2003). The scale consists of 24 items measuring the six motivational subtypes of SDT Theory (four questions per subtype) on a 7-point Likert scale (1 = "does not correspond at all", 7 = "corresponds exactly"). The scale begins with the question "Why are you doing things for the environment?" to which the participant rates different responses corresponding to the various motivational subtypes. Responses for intrinsic motivation items include "for the pleasure I experience while I am mastering new ways of helping the environment"; integrated regulation items include responses such as "because taking care of the environment is an integral part of my life"; identified regulation responses include "because it is a reasonable thing to do to help the environment"; introjected regulation responses include "I think I'd regret not doing something for the environment"; external regulation items include responses such as "because my friends insist that I do it"; and finally, amotivation responses include "honestly, I don't know; I truly have the impression that I'm wasting my time doing things for the environment". For each participant, items from the identified, integrated and intrinsic subscales were averaged to form a self-determined (SD) motivation index, while items from the introjected regulation, external regulation and amotivation subscales were averaged to form a non-self-determined (NSD) motivation index. Higher scores on these indicate higher SD or NSD motivation, respectively.

Table 1 has the means and standard deviations for the SD and NSD motivation indices. The Cronbach's alphas for the two composite variables were .84 for the SD motivation index and .64 for the NSD motivation index. The lower alpha for the controlled motivation index was due to an unusually low reliability for the external regulation items, and was most likely a product of the small sample size, as previous studies using larger samples have not encountered this deficiency (e.g., see Villacorta et al., 2003).

Goals. Participants' goals during the LGLT were assessed using a novel questionnaire that was designed for the purposes of this research (see Appendix B). The questionnaires contained 7 items pertaining to different goals that person may have during the LGLT. The 7 items on goals were: "to make more money than the other person", "to keep my earnings even with the other person", "to return as many fish as I could to the lake every round, regardless of my total earnings", "to make the most money that I could every round", "to throw back just enough to keep the population stable", "my strategy varied throughout all of the trials as I was trying to figure out how the other person was going to behave", and "my strategy was inconsistent because I did not really care much about the task". Participants rated their responses on a 1 to 7 Likert rating scale (1= does not correspond at all, 4= corresponds moderately, 7=corresponds exactly). Participants were given two versions of this questionnaire: one to answer with respect to their goals during the practice trials, and one to answer with respect to the real trials. However, for data analysis, only the responses on the 'real trials' items were used. The instructions were clearly listed at the top of the questionnaire as to which set of trials they should be answering. Table 1 has the means and standard deviations and for all seven goals.

Table 1

Descriptive Statistics and Correlations between Variables for Pilot Study

Variable	*M*	*SD*	2	3	4	5	6	7	8	9	10
1. SD Motivation	4.37	*.96*	.251	-.248	-.229	.411*	-.095	-.144	.047	.018	.435*
2. NSD Motivation	2.64	*.71*	-	.104	.103	.093	.007	.143	.204	.330	.197
3. Goal 1 – Make More Money Than Partner	3.10	*2.04*		-	.445*	-.456*	.409*	-.146	.408*	.185	-.382*
4. Goal 2 – Keep Earnings Even	2.79	*1.95*			-	-.461*	-.043	-.332	.288	.711**	-.250
5. Goal 3 – Return As Many Fish As Possible	4.07	*1.95*				-	-.450*	-.067	-.154	-.375*	.556**
6. Goal 4 – Make the Most Money Every Round	2.31	*1.76*					-	.035	.276	.091	-.620**
7. Goal 5 – Only Keep Fish Pop. Stable	4.86	*1.87*						-	-.229	-.166	-.048
8. Goal 6 – Strategy Varied: Reacting to Partner	3.52	*2.17*							-	.288	-.330
9. Goal 7 – Strategy Varied: Did Not Care	1.41	*.73*								-	-.096
10. Proportion of Fish Returned	.60	*.15*									-

*p=<.05, **p=<.01

Proportion of Fish Returned. The proportion of fish returned to the lake was calculated by dividing the total number of fish returned to the lake by each participant by the total number of fish encountered over the entire LGLT.

Results

Descriptives for each variable and inter-variable correlations can be seen in Table 1. Data were cleaned of all univariate outliers by examining z-scores on relevant variables to see if they were above or below 3.29 standard deviations. Any univariate outliers were transformed to be 1 unit above or below the next closest value, as per the recommendation of Tabachnick and Fidell (2007). After one round of transformations, no univariate outliers were found to be present in the data. Normality of variables was assessed via descriptives analysis and examination of skewness and kurtosis values and their corresponding standard errors. No variables were found to be significantly skewed or kurtic. Furthermore, no multivariate outliers were found in the data using Mahalanobis distances as the relevant measure. Two participants had their data removed from the dataset due to insufficient belief in the experimental deception, as indicated via participants' responses and comments during the debriefing procedure.

Bivariate correlations were conducted between all pairs of variables using Pearson's product-moment correlation coefficients. The results of this analysis can be seen in Table 1. With respect to *hypothesis 1*, the data supported this hypothesis, as there was a significant positive correlation between SD motivation and having an intrinsic goal (r=.41, p=.03). However, no significant negative relationship was found between SD motivation and extrinsic goals, and thus *hypothesis 2a* and *2b* were not supported. Moreover, no significant relationships were found between NSD motivation and any of the goals, unfortunately, and so *hypothesis 3*, *4a* and *4b*

were also not supported by the data. In addition, the bivariate correlations between personal goals and proportion of fish returned were also examined. With respect to *hypothesis 5a*, it was found that pursuing an intrinsic goal was significantly, positively related to the proportion of fish returned (r=.56, p=.002), thus supporting this hypothesis. Moreover, pursuing extrinsic goals had significant, negative relationships with the proportion of fish returned, specifically for the goals of making more money than the other person (r=-.38, p=.04) and the goal of making the most money possible every round (r=-.62, p<.0005). Thus, *hypothesis 5b* and *5c* were also supported by the data.

Following the bivariate correlation analyses, a linear regression was performed using SD and NSD motivation aggregate indices as the predictor variables and proportion of fish returned as the predicted variable in order to understand any unique predictive utility between the two categories of motivational quality and behavior in the LGLT. The overall regression model was marginally significant [F(2, 26)= 3.21, p= .057], with the predictors explaining 19.8% of the variance in the predicted variable. Though the omnibus ANOVA did not exceed the normally used .05 cut-off, the omnibus ANOVA is meant to test the family-wise alpha of the entire set of predictors, and has been shown to have an acceptable cut-off of .15 in order to mirror other tests of family-wise alpha rates (Tabachnick & Fidell, 2007). Examining the individual beta coefficients showed that only SD motivation was a significant predictor of proportion of fish returned (std. β= .41, t= 1.92, p= .032), with NSD motivation being non-significant (std. β= .09, t= .51, p= .611). Thus, *hypothesis 6a* was supported by the data, while *hypothesis 6b* was not.

Discussion

One of the primary purposes of the pilot study was to test the experimental task that would be used in the rest of the experiments for this thesis. To this aim, the pilot study was quite successful. Testing during the pilot study illuminated necessary modifications to the experimental script in order to increase its believability in subsequent experiments. For example, while testing participants in the pilot study, it was shown that some people would not be interested in keeping the fish in order to sell them, but preferred to conceptualize the task in such a way that meant each fish kept would be eaten, and therefore could save money on groceries. Thus, the experimental script was modified such that participants in subsequent studies would be told that they would, if they believed they would be apt to want it, have their own personal store of fish kept for dietary purposes that are separate from the number of fish that were caught each round.

In addition, via testing participants, it was illuminated that using a replenishment rate that was based on a proportion instead of a fixed amount, and the lack of a control on the cap of the number of fish that could be in the lake at any given time, could end up skewing the results. That is, participants that were strongly motivated to see the number of fish in the lake rise (i.e., to see the population increase) were throwing back nearly all the fish they caught every round. Combined with the proportionate replenishment rate (15% of whatever was left in the lake per round), the number of fish in the lake could skyrocket to over a one and a half thousand fish quickly. At this point, some participants mentioned that they started keeping all the fish they caught for several rounds in order to try and balance out the population. Thus, this particular problem could have the impact of deflating the overall average number of fish kept vs. thrown back, and would be adjusted in future versions of the LGLT (the replenishment rate would become a fixed amount, it would be adjusted according to how many fish were in the lake such

that it would become smaller as the fish population rose above certain thresholds, and there would be a finite cap on the amount of fish the lake can hold). These changes were also incorporated into the experimental script so that participants would also be aware of the replenishment rate, how it changes, and what the population cap was.

Lastly, via participant feedback, it was shown that some parts of the experimental design detracted from the believability of the existence of their false partner. These aspects were subsequently eliminated or modified for future versions of the experiment. For example, some participants did not understand how two people could sign up for the same study via the ISPR, and this seemed to be the most common reason for not believing in, or at least being suspicious of the existence of the fake partner. Thus, the script was modified for Study 1 such that participants would be given a brief description of how both participants signed up, and the fact that the participant's partner was being run through a slightly different version of the experiment in the INSPIRE lab with a colleague of the experimenter, and thus they would not be meeting with or interacting with their partner as a matter of experimental control.

With respect to the hypothesized relationships between motivation and goals, as well as motivation and proportion of fish returned to the lake, the hypotheses surrounding SD motivation, having an intrinsic goal and having higher proportion of fish returned to the lake were supported by the data, while the hypotheses surrounding NSD motivation and having an extrinsic goal were not supported by the data. However, the hypotheses surrounding extrinsic goals and lower levels of fish returned to the lake were supported by the data. Given the low sample size for the pilot study, statistical power could have been an issue with respect to Type II error rates for the non-significant findings regarding NSD motivation. Moreover, there was a relatively low reliability of the NSD motivation index, which may have also contributed to the

null results regarding hypotheses using this variable. However, the fact that many other significant relationships were found despite having a low sample size indicated that increasing the sample size in conjunction with the improvements made to the experimental design would most likely improve the quality of future data analysis.

In addition, the hypothesized relationships between proportion of fish returned to the lake and intrinsic and extrinsic goals were all supported by the data. The proportion of fish returned to the lake was significantly, negatively related to the goals of making more money than the other person, and having the highest total earning possible every round; conversely, the proportion of fish returned to the lake had a positive, significant relationship with the goal of returning the most fish to the lake every round regardless of total earnings. Likewise, the relationships between goals were consistently in anticipated directions. The correlation between the goal of returning the most fish every round was negatively correlated with the goal of having the highest earnings, the goal of making more money than the other person, the goal of keeping earnings even with the other person, and not caring about the task. Thus, the pattern of findings from the pilot study was promising, and warranted moving forward with the main experiments in this thesis line.

Main Studies

Study 1

Because of the severity of the consequences of a mismanaged natural resource, examining ways to promote cooperation within a resource dilemma is an important avenue of investigation and application. While a variety of psychological and social factors have been identified that can be of utility in designing interventions to increase rates of cooperation among group members sharing a finite resource, the focus of such research is on interpersonal constructs and processes. Naturally, when examining how multiple people will interact with one another in order to manage a finite natural resource, it is relatively logical to concentrate efforts on social and interpersonal processes, as the goal is to increase the overall cooperation of the group as a whole.

However, this has come largely at the expense of examining intraindividual psychological constructs and processes that will, inevitably, have an effect on the interpersonal ones. In other words, it is important to understand what each individual brings with them into the group, before the resource dilemma even begins, and understand how this will exert an effect on interpersonal proenvironmental behaviours, and also how they will develop and potentially change over time in conjunction with interpersonal processes. As mentioned in the general introduction of this thesis (Chapter 1), an important intraindividual psychological construct that has been generally overlooked or somewhat confounded with definitional problems is individual motivation and goals. Using SDT as a theoretical framework, this research will investigate how pre-existing overall environmental motivation will affect the content of personal goals set within an interpersonal framework (i.e., a resource dilemma), and how goal content will, in turn, affect

the degree to which people act proenvironmentally within the dilemma (i.e., how well they can manage the health of a finite natural resource).

Objectives of Study 1

Overall, it is the objective of this study to (a) expand on previous research examining SDT and individual proenvironmental behaviours into the area of cooperative, interpersonal behaviours, thereby expanding both the theory itself as well as providing the area of resource dilemma research with a practical theoretical framework in studying the relationship between motivation and cooperation over finite resources, (b) to expand the knowledge base of intraindividual factors that influence behaviour in resource dilemmas, and (c) to provide a pathway model by which motivation can be shown to predict goal content, which then will predict behaviour.

From SDT, the following hypotheses were derived to guide our interpretations of the results of the planned mediation analysis. *Hypothesis 1* anticipates that motivational quality toward environmental behaviours will be a predictor of the pursuit of intrinsic versus extrinsic goals, such that SD motivation will be a significant positive predictor of the strength of intrinsic goal pursuit, while NSD motivation will be a significant positive predictor of the strength of participants' extrinsic goal pursuit. *Hypothesis 2* expects that motivational quality (SD and NSD) and goals (intrinsic and extrinsic) will be significant predictors of proenvironmental behaviour in the resource dilemma, such that SD motivation and intrinsic goals will be positive predictors of greater amounts of fish in the lake at the end of the task (i.e., greater proenvironmental behaviour), while NSD and extrinsic goals will be negative predictors of proenvironmental behaviour in the dilemma. Moreover, *hypothesis 3* predicts that there will be an indirect effect of

motivation on proenvironmental behaviour in the dilemma through goals. That is, SD motivation will have an indirect effect on proenvironmental behaviour in the dilemma through intrinsic goals, while NSD motivation will have an indirect effect on proenvironmental behaviour in the dilemma through extrinsic goals.

Method

Participants and Procedure

A sample of first-year university students from a Canadian university enrolled in an introductory psychology course participated in this lab-based study in exchange for a course credit (final sample size *N*=66). Age was measured in the ISPR prescreen during this testing period via age ranges ('under 18', '18-20', '21-25', '36+'). The mode for responses for the age of participants was '18 to 20' (78.8%) years of age. The majority of participants were female (n=45), with 21 male participants. Most participants were Caucasian (n=44), with a smaller sampling from other ethnicities, namely Asian (n=6), Hispanic (n=1), African-American (n=3), Arabic (n=1) and undefined ethnicity according to the data collection methods of the ISPR (i.e., selected "Other"; n=9), with missing demographics for 2 participants regarding ethnicity.

Prospective participants were invited via the Integrated System of Participation in Research to participate in a lab-based study titled "Go Fish: Motivation and Resources", under the premise that they would be participating in conjunction with another participant in a partnered task; however, the 'partner' did not exist and was instead simulated using the resource dilemma program itself. On arriving at the experimentation room, the study was explained to the participants and they were given time to give proper informed consent. Participants were reminded before giving consent that there would be a part of the experiment that involved

completing an online task with a partner in real-time. Each participant was instructed that "for control purposes, such as eliminating biases and stereotyping based on gender or ethnicity, you will not be meeting or talking to your partner. Instead, you will each do the partnered task in your own private space. This also helps to better ensure that your anonymity and confidentiality are protected, as detailed in your consent form."

Afterwards, participants were given the *Motivation Toward the Environment Scale* (MTES) to complete. Once this was done, participants were given an explanation of how the Little Gull Lake Task worked (LGLT), and were given a chance to ask any and all questions. Participants were then allowed to complete 12 practice trials of the LGLT on their own, which were not recorded, but were specifically for the purpose of allowing them to become familiar with the parameters of the task. The real trials of the LGLT, which immediately followed the practice trials after participants were allowed a question period, lasted upwards of 48 rounds.

Once the LGLT was completed, participants were given the goals questionnaire to complete on their own. Following this, participants were debriefed on the nature of the deception involved in the study. Participants were asked if they believed in the premise of the 'other' participant. Any participants that answered that they did not believe the premise at all did not have their data included in subsequent analyses (no participants were excluded on this basis, as the experimental design was rigorous enough that all participants believed in the real existence of their 'partner' to a sufficient degree).

Experimental Task: the Little Gull Lake Task. The same Little Gull Lake Task (LGLT) as was used in the pilot study was used in Study 1, with some differences. To begin with, the max time of 10 minutes was removed in order to eliminate temporal pressure put on participants

regarding their own decision times. In addition, the replenishment rate was changed from 15% of the total number of fish left after participants made their decisions each round, to a static 20 fish per round. Moreover, participants were made aware of the replenishment rate in the experimental script. Furthermore, the decision time of the fake partner was lengthened slightly, from 1-3 seconds to 2-4 seconds, and participants were instructed that the program would take a second or two to calibrate both their response and their partners', but that they may also need to wait a moment or two sometimes for their partner to make their decision. Lastly, as part of the experimental script, participants were told that if fish was a part of their regular diet and they wanted to incorporate this into the scenario, then they were instructed to imagine that they kept their own separate supply of fish for dietary purposes that was not part of the 30 fish drawn each round. Thus, they were instructed they did not need to imagine that they would keep a certain number of fish each round to eat, as this would exist in a hypothetical separate personal cache.

The experimental deception was also modified slightly. The participant was told that, while the experiments had different purposes, the timeslots for the experimental sessions were yoked together via the Integrated System of Participation in Research. Moreover, the participant would be completing the experimental task with their partner in real-time using a web based application. The participant was told that, for ethical reasons for protection of anonymity and confidentiality, as well as experimental control in order to prevent the possibility of any bias occurring in behaviour due to gender, age or ethnicity, they would not be meeting or talking with their partner during the course of the experiment. Rather, they would simply be conducting the experimental task together in real-time, as the experiments had been designed to have the task occur at the same time. However, participants were instructed that there may be small wait times before the beginning the experimental task, as they might be simply waiting for their partner to

catch up in the experimental procedure. In order to simulate this, just after finishing the private practice trials (i.e., just before beginning the real trials), the experimenter would ask each participant to wait while they went to the INSPIRE lab to make sure their partner was ready. In fact, the experimenter simply left the participant alone in the private testing room, would go out of sight in case the participant might happen to, for any reason, look out the door, and wait a period of 45-65 seconds before returning and telling the participant "alright, your partner is all ready to go, so you can go ahead and begin and they should be waiting for you".

Measures

Motivation Toward Environmental Behaviours. Participants' motivation to perform PEBs in the context of their general lives was assessed using the Motivation Toward the Environment Scale (MTES; Pelletier et al., 1998; see Pelletier, Baxter & Huta, 2011), which has been validated in previous studies (see also Villacorta et al., 2003). The scale consists of 24 items measuring the six motivational subtypes of SDT Theory (four questions per subtype) on a 7-point Likert scale (1 = "does not correspond at all", 7 = "corresponds exactly"). The scale begins with the question "Why are you doing things for the environment?" to which the participant rates different responses corresponding to the various motivational subtypes. For each participant, items from the identified, integrated and intrinsic subscales were averaged to form a self-determined (SD) motivation index, while items from the introjected regulation, external regulation and amotivation subscales were averaged to form a non-self-determined NSD) motivation index. Table 1 has the means and standard deviations for the SD and NSD motivation indices. The Cronbach's alpha for the SD motivation index was .89, while the alpha for the NSD motivation index was .80.

Goals. Participants' goals during the LGLT were assessed using a novel questionnaire that was designed for the purposes of this research (see Appendix C). The questionnaire contained 7 items pertaining to different goals that a person may have during the LGLT. Originally, three items were formulated in relatively extrinsic terms: "to make more money than the other person", "to keep my earnings even with the other person", "to make the most money that I could every round"; two items were formulated in relatively intrinsic terms: "to return as many fish as I could to the lake every round, regardless of my total earnings", "to throw back just enough to keep the population stable"; and two items that reflected the possibility that participants could be uncertain about their goals: "my strategy varied throughout all of the trials as I was trying to figure out how the other person was going to behave" (a reactive strategy), and "my strategy was inconsistent because I did not really care much about the task" (essentially, an amotivated strategy). Participants rated their responses on a 1 to 7 Likert rating scale (1= does not correspond at all, 4= corresponds moderately, 7=corresponds exactly).

As goals were the intended mediators in the planned mediation analysis, and in order to reduce the sheer number of mediators to be used in that analysis, a Principal Components Analysis (PCA) was done on the goals measure using Varimax rotation in order to reduce the larger number of variables onto a smaller number of components. Goal 7 was omitted from the analysis due to excessively high non-normality. Three components with Eigenvalues greater than 1 were discovered, and together explained 71.5% of the variance in the variables. Component 1 (labeled "extrinsic goals") contained goal 1 (to make more money than the other person; factor loading=.80) and goal 4 (to make the most money that I could every round; factor loading=.87); Component 2 (labeled "reactive goals") contained goal 2 (to keep my earnings even with the other person; factor loading=.76) and goal 6 (my strategy varied throughout all of the trials as I

was trying to figure out how the other person was going to behave; factor loading=.62); and lastly, Component 3 (labeled "intrinsic goal") simply contained goal 3 (to return as many fish as I could to the lake every round, regardless of total earnings; factor loading=.91). Goal 5 (to throw back only as much as was necessary to keep the population stable) had a negative loading on the Reactive Goals; so, in order to keep conceptual simplicity of this component (i.e., choosing not to reverse score), this goal was also omitted from future analyses. Components were subsequently calculated by averaging scores for the goals that comprise them. Table 2 has the means and standard deviations and for the three components.

Results

Descriptives for each variable and inter-variable correlations can be seen in Table 2. Data were cleaned of all univariate outliers by examining z-scores on relevant variables to see if they were above or below 3.29 standard deviations (Tabachnick & Fidell, 2007). Any univariate outliers were transformed to be 1 unit above or below the next closest value, as per the recommendation of Tabachnick and Fidell (2007). After two rounds of transformations, no univariate outliers were found to be present in the data. One multivariate outlier was found in the data using Mahalanobis distances as the relevant measure at the $p<.01$ level, and was subsequently removed from the dataset. Normality of variables was assessed via descriptives analysis as well as examination of skewness and kurtosis values and their corresponding standard errors. The dependent variable, the number of fish in the lake after the task was over, was found to be somewhat non-normal (kurtosis value with a ratio of skew-to-error higher than 3:1), and thus a square-root transformation was done on the data. The mean and standard deviation reported are drawn from the raw, untransformed data in order to present an interpretable, meaningful number. However, the correlations between this variable and all other relevant

Table 2

Descriptive Statistics and Correlations between Variables for Study 1

Variable	*M*	*SD*	2	3	4	5	6
1. PEB in LGLT	146.77	*103.20*	.11	.30*	-.34**	-.49**	-.32*
2. SD Motivation	4.57	*.85*	-	.36**	.02	-.24	-.31*
3. Intrinsic Goal	3.27	*1.81*		-	.06	-.13	-.08
4. NSD Motivation	2.91	*.71*			-	.15	-.04
5. Extrinsic Goals	3.05	*1.69*				-	.29*
6. Reactive Goals	3.46	*1.48*					-

Note. PEB = Proenvironmental behaviour, measured by the number of fish left in the lake at the end of the task, LGLT = Little Gull Lake Task, the resource dilemma employed in this study, SD = Self-Determined, NSD = Non-Self-Determined.
*p=<.05, **p=<.01

variables are reported using the square-root transformation so as to remove the bias from the kurtosis. Since the main analysis using this variable is a bootstrapped mediation analysis, and since this is a known technique for dealing with non-normal data (Tabachnick & Fidell, 2007), the non-normality of the DV was not an influencing or problematic factor, and the untransformed variable was used for this procedure.

In order to test the proposed mediational pathway model, a bootstrapped mediation analysis was conducted in SPSS using the MEDIATE bootstrapping macro provided by Preacher and Hayes (2004; 2008; Hayes & Preacher, 2014). In this analysis, SD motivation and NSD motivation indices were both used as independent variables (Xs), goal composites (extrinsic goals, reactive goals, intrinsic goal) based on the results from the PCA were used as the mediators (Ms), and the number of fish left in the lake at the end of the LGLT was used as the dependent variable (Y) as a measure of proenvironmental behaviour. The number of bootstrapped samples used by the analysis was set to 10,000. The reporting of the results of the mediational analysis is broken down into three parts: testing the path from Xs to Ms (Table 3), testing the path from Xs and Ms to Y (Table 4), and then testing the indirect effects using 95% confidence intervals of the effect statistic (Table 5).

With respect to the relationships between the predictors (Xs) and the mediators (Ms), SD motivation was a significant positive predictor of having an intrinsic goal, a negative predictor of having reactive goals, and a negative predictor of having extrinsic goals. Conversely, NSD motivation was not a significant predictor of any of the goals after controlling for the variance already accounted for by SD motivation.

Table 3

Bootstrapped Mediation Results for Independent Variables Predicting Mediators for Study 1

			Predictor Statistics			Model Summary			
Model	Independent Variables	Dependent Variables	Coeff.	*t*	*p*	*R*	R^2	*F*	*p*
X's predicting M's	SD Motivation	**Extrinsic Goals**	**-.48**	**-1.98**	***.004***	**.28**	**.08**	**2.65**	***.078***
		Reactive Goals	**-.54**	**-2.55**	***.013***	**.31**	**.10**	**3.30**	***.04***
		Intrinsic Goal	**.71**	**3.00**	***.004***	**.36**	**.13**	**4.62**	***.014***
	NSD Motivation	Extrinsic Goals	.36	1.23	*.224*				
		Reactive Goals	-.06	-.23	*.819*				
		Intrinsic Goal	.13	.44	*.664*				

Note. Statistics are taken from step 1 of a bootstrapped mediation analysis using the MEDIATE macro provided by Preacher & Hayes (2004; 2008) using SPSS, in which the independent variables (X's) are used to predict the mediators (M's). Full analysis used SD motivation and NSD motivation as dual predictors (X's), goal composites as the mediators (M's), and the number of fish in the lake as the dependent variable (Y). Model summaries provided in this table are for SD motivation and NSD motivation as predictors, and thus represent the model summary for both variables. Therefore, they are only presented once, since they would be the same for both variables. Model summaries represent family-wise error rate, and as such values below .10 were considered acceptable (Tabachnick & Fidell, 2007) to examine individual betas, since it is the individual betas in this part of the mediation analysis that are of interest, and not necessarily the significance of the overall model. Significant coefficients have been bolded for ease of identification.

Table 4

Bootstrapped Mediation Results for Independent Variables and Mediators Predicting Number of Fish Left in the Lake for Study 1

			Predictor Statistics			Model Summary			
Model	Dependent Variable	Independent Variables	Coeff.	*t*	*p*	*R*	R^2	*F*	*p*
X's and M's predicting Y	Number of Fish Left in the Lake	SD Motivation	-12.44	-1.01	*.314*	.73	.54	13.61	*<.001*
		NSD Motivation	**-45.07**	**-3.42**	***.001***				
		Extrinsic Goals	**-20.43**	**-3.48**	***.001***				
		Reactive Goals	**-20.01**	**-2.96**	***.004***				
		Intrinsic Goal	**24.44**	**4.47**	***<.001***				

Note. Statistics are taken from step 2 of a bootstrapped mediation analysis using the MEDIATE macro provided by Preacher & Hayes (2004; 2008) using SPSS, in which the independent variables (X's) and the mediators (M's) are used to predict the dependent variable (Y). Full analysis used SD motivation and NSD motivation as dual predictors (X's), goal composites as mediators (M's), and the number of fish in the lake as the dependent variable (Y). Significant coefficients have been bolded for ease of identification.

Table 5

Bootstrapped Mediation Results for Indirect Effects for Study 1

			SD Motivation				NSD Motivation			
Model	Dependent Variable	Mediators	Effect	SE(boot)	*LLCI*	*ULCI*	Effect	SE(boot)	*LLCI*	*ULCI*
Indirect Effects of X's on Y through M's	Number of Fish Left in the Lake	Extrinsic Goals	**9.82**	**5.04**	**1.59**	**22.27**	-7.31	7.54	-23.50	6.68
		Reactive Goals	**10.79**	**6.00**	**1.81**	**25.81**	1.16	5.73	-8.83	14.77
		Intrinsic Goals	**18.58**	**7.67**	**6.24**	**36.52**	3.24	7.73	-13.57	17.57

Note. Statistics are taken from step 3 of a bootstrapped mediation analysis using the MEDIATE macro provided by Preacher & Hayes (2004; 2008) using SPSS, in which the indirect effect of the independent variables (X's) on the dependent variable (Y) through the mediators (M's) are determined. Full analysis used SD motivation and NSD motivation as dual predictors (X's), goal composites as the mediators (M's), and the number of fish in the lake as the dependent variable (Y). Indirect effects are signaled when the lower limit confidence interval (LLCI) and the upper limit confidence interval (ULCI) do not pass through zero (indicating that there would be a null relationship contained in the 95% confidence intervals). Significant indirect effects have been bolded for ease of identification.

With respect to the relationships between the predictors (Xs) and mediators (Ms) with the dependent variable (Y), NSD motivation, having extrinsic goals and having reactive goals were all negative predictors, while having an intrinsic goal was a positive predictor. While SD motivation did not have a significant direct effect on the dependent variable on its own, this is not a necessary prerequisite for running a bootstrapped mediation (see Preacher & Hayes, 2008).

Lastly, with respect to indirect effects, three significant indirect effects were identified. Specifically, SD motivation was found to have a significant indirect effect on participants' proenvironmental behaviour in the LGLT (i.e., number of fish left in the lake) through all three goals. That is, SD motivation had a significant, positive indirect effect on PEB in the LGLT through increasing intrinsic goal strength, decreasing extrinsic goals strength, and decreasing reactive goals strength. No indirect effects were found for NSD motivation through any of the goals; instead, NSD motivation was found to have a significant, negative direct effect on PEB in the LGLT. The uncovered model can be seen in Figure 2.

Based on these results, it can be concluded that *hypothesis 1* was partially supported, as SD motivation was a positive predictor of the intrinsic goal of returning as many fish to the lake as possible every round (though NSD motivation was not found to be a significant predictor of extrinsic goals). *Hypothesis 2* was also supported by the data, as the full model of motivation and goals was a significant predictor of participants' level of proenvironmental behaviour in the LGLT. Lastly, *hypothesis 3* was partially supported, as SD motivation had a significant indirect effect on proenvironmental behaviour in the LGLT through having an intrinsic goal of returning as many fish to the lake as possible every round regardless of total earnings (though NSD motivation, instead, was shown to have a direct, negative relationship with such).

Figure 2 Mediation Model Uncovered from Study 1 Analysis

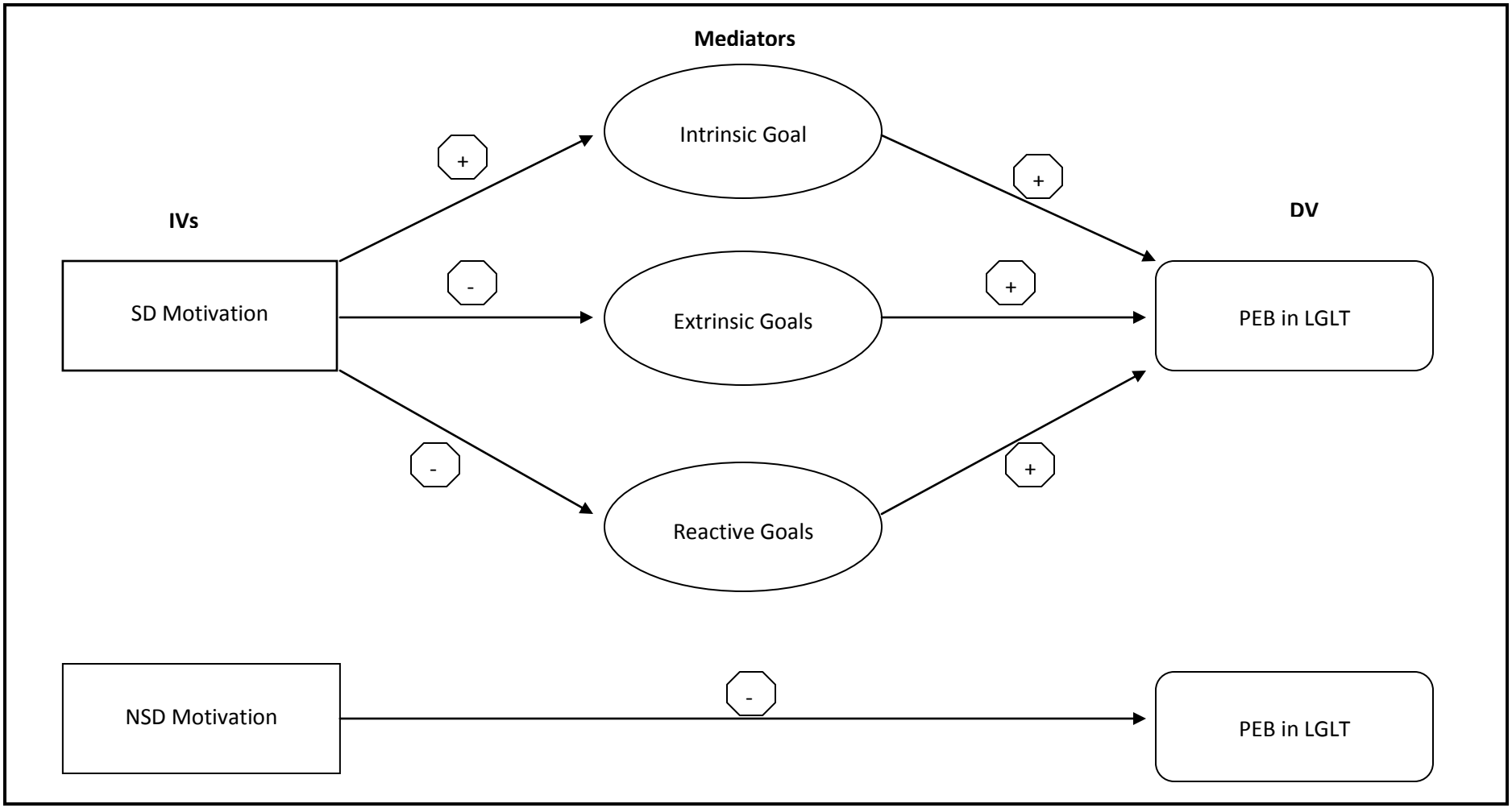

Figure 2. Diagram of the model uncovered by the bootstrapped mediation analysis from Study 1. SD=Self-determined, PEB=Proenvironmental behaviour, LGLT=Little Gull Lake Task, NSD=Non-self-determined. The intrinsic goal was the goal to return as many fish to the lake as possible every round regardless of total earnings. Positive signs between IV and mediators indicate a positive relationship, while negative signs indicate a negative relationship. Positive signs between mediators and DV indicate an overall positive effect of full indirect effect on DV.
NSD motivation had a significant, negative direct relationship with DV.

Discussion

The objectives of the this study were to expand on previous research examining SDT and individual proenvironmental behaviours, to expand our knowledge of the influence of motivation on behaviour in a resource dilemma, and to generate a pathway model by which motivation can be shown to predict goals, which then predict behaviour. With respect to the proposed model, we had three hypotheses: (1) participants' motivation (SD motivation and NSD motivation) would be a significant predictor of their goals (intrinsic and extrinsic, respectively) in the dilemma, (2) goals would be significant predictors of behaviour in the dilemma, with having an intrinsic goal being a positive predictor of the number of fish left in the lake, and extrinsic goals being a negative predictor of such, and (3) there will be an indirect effect of motivation on behaviour through participants' goals.

Overall, the results showed a significant relationship between motivation as defined by SDT and proenvironmental behaviour in an iterated, partnered resource dilemma, and they provide support for the application of this theory into the realm of cooperative behaviours. In addition, the successful application of SDT to resource dilemmas demonstrates the importance of understanding intraindividual factors as well as interpersonal ones when trying to predict behaviour in a resource dilemma, and helps to alleviate the problems associated with previous conceptualizations of motivation and goals in past research, as the constructs of motivations and goals used in this study are clearly differentiated. With respect to the first point, the results of the bootstrapped mediation showed that, when taken together, motivation and goals can explain a large portion of the variance in proenvironmental behaviour in the resource dilemma (54%), indicating a strong effect. This provides support for the value of understanding intraindividual factors in predicting resource management behaviour. Lastly, our goal was to provide a pathway

model by which motivation affects intrinsic and extrinsic goals, and goals, in turn, affect behaviour, which was largely supported.

With respect to our hypotheses, these were found to be, for the most part, supported by the data, though some caveats must be applied. *Hypothesis 1* was that participants' motivation (SD motivation and NSD motivation) would be a significant predictor of their goals (intrinsic and extrinsic, respectively) in the dilemma. This hypothesis was partially supported by the data. SD motivation was found to be a significant positive predictor of having an intrinsic goal, while also being a negative predictor of extrinsic goals and reactive goals. This suggests that, the more self-determined a person is, the more they focus on the health of the resource, the less they focus on extrinsic rewards, and the more proactive they are in striving for their own goals. In contrast to the findings on SD motivation, NSD motivation was found to have a significant, negative and direct relationship with proenvironmental behaviour in the LGLT, but was not a significant predictor of goals. In this way, *Hypothesis 1* was partially supported by the data.

Hypothesis 2 was that motivation and goals would be significant predictors of behaviour in the dilemma. This hypothesis was supported by the data. NSD motivation, extrinsic goals and reactive goals were significant, negative predictors of proenvironmental behaviour in the LGLT, while having an intrinsic goal was a significant, positive predictor of proenvironmental behaviour.

Hypothesis 3 predicted that motivation would have an indirect effect on proenvironmental behaviour in the LGLT through personal goals. This hypothesis was also supported by the data, as the degree to which a person was self-determined in their motivation towards their general environmental behaviours predicted the degree to which their goal content would be intrinsic. This, in turn, predicted the degree to which the person would act

proenvironmentally within the LGLT. In other words, the more self-determined a person's overall environmental motivation, the more intrinsically oriented their personal goals were in the LGLT, and through this effect, the more likely they were to have more fish left in the lake at the end of the dilemma. In addition, it was found that, the more self-determined a person was in their motivation, the less likely they were to have extrinsic goals or reactive goals, and through this, they were more likely to leave more fish in the lake at the end of the task. So, not only did having self-determined motivation towards environmental activities in general predict specific intrinsic goal content in the LGLT, it also predicted reducing extrinsic and reactive goal content as well, all of which contributed to a healthier fish population at the end of the task. This temporal sequence is an illustration of the importance of understanding intraindividual psychological phenomena, which a person brings with them into the dilemma, in trying to predict the interpersonal behaviours that occur in a resource dilemma. In the case of this experiment, participants brought with them a general motivational quality towards their overall environmental behaviour, and this motivation was a significant factor in predicting the specific goal content they would create for themselves while conducting the novel task used for the resource dilemma in this experiment. This specific goal content, then, would become a more proximal predictor of what their behaviour would be inside the dilemma.

In sum, the results of Study 1 provided foundational knowledge that intraindividual psychological factors are important to consider when examining behaviour in a resource dilemma. More specifically, Study 1 demonstrated that the application of the typology of motivation and goals of SDT is a useful model in predicting interpersonal behaviours surrounding the sharing of a finite natural resource. Where past research may have generally overlooked motivation and goals (as well as other intraindividual psychological constructs), and

where past research that did examine motivation and goals may have been troubled by confounding definitions between the two concepts, this study successfully disentangled the two by using SDT as a theoretical framework; moreover, by doing so, it provides a solid foundation of knowledge upon which to examine more complex questions in future research.

Study 2

In Study 1, we provided foundational evidence that SD motivation is a significant predictor of goals, which then are significant predictors of cooperative, interpersonal proenvironmental behaviour, expanding on previous knowledge surrounding individual proenvironmental behaviours (Pelletier, Baxter & Huta, 2011). In Study 2, we sought to test two competing theories against each other. On the one hand, economic models predict that the presence of sanctions (monetary incentives) in a resource dilemma should increase cooperation substantially (see Balliet et al., 2011). On the other hand, SDT predicts that the presence of external reinforcers (i.e., monetary incentives) will affect the quality of a person's motivation, encouraging externally regulated behaviour, and discouraging the internalization of the motivation for cooperative, proenvironmental behaviour. This will lead to degradation in performance of said behaviour over time (see Deci & Ryan, 2000). Moreover, despite the overall findings from the Balliet et al. (2011) meta-analysis, several studies have shown that sanctions will lead to the perception that others in the dilemma are extrinsically motivated, and because of such cannot be trusted to act sustainably on their own. We sought to more directly test this hypothesis by measuring participants' perception of their partner's goal(s).

Thus, in Study 2 we introduced a centralized sanction system (CSS) into the LGLT. In this system, participants are fined from their in-task cumulative earnings for each round in which they do not throw back enough fish (i.e., for throwing back less than 15 fish), or monetarily rewarded for throwing back more than a sustainable amount of fish (i.e., for throwing back 25 or more fish). Each participant would see both versions of the task in two blocks of trials, with order counterbalanced across 2 groups, creating a 2[order of presentation: sanction system first (SSF) vs. no-sanctions first (NSF)] x2(sanctions vs. no-sanctions) mixed-factorial design, with

repeated measures on the second factor. Through this methodology, we sought to test multiple hypotheses using SDT as a guide, while also respecting the previous research addressed in the Balliet et al. meta-analysis.

Past research examining the potential negative effects of sanctioning systems on rates of cooperation in social dilemmas typically employed a design wherein either two groups were compared on a single block of rounds in a social dilemma (e.g., Tenbrunsel et al., 1999), or using a within-subjects design wherein subjects initially saw a social dilemma with a centralized sanction system included at time 1, and compared behaviour in this block against time 2 when the sanctioning system was removed. Because of the somewhat exploratory nature of the present research – given that this type of research has not been conducted before, and therefore we wanted to provide as rich a knowledge foundation as possible – it was necessary to employ a variety of dependent variables, in addition to exploring the effects of a CSS both when it has been added (after participants had experienced the task without it) and when it was removed (after participants had first only experienced the task with the sanctioning system present); this, however, lead to increased requirements of time and cognitive energy from each participant. Thus, an ABA design would have required too much from each participant, and lead to significant cognitive fatigue (as it would push the experimentation time to well over an hour and fifteen minutes).

Instead, we created two experimental groups (sanction system first vs. no-sanction first) whereby each group would still experience both conditions of the task (sanctions vs. no-sanctions), such that we would (a) still be able to recreate the same comparisons used in previous research, and (b) examine both directions concomitantly. While the main focus of the experiment was, nevertheless, to compare the sanction condition with the no-sanction condition

in order to see overall effects of the CSS on the chosen dependent variables, this methodology also allowed us to explore effects of the order of presentation in a larger capacity than previous experiments. However, the hypotheses guiding the research, nevertheless, focus mostly on the general effects of sanctions vs. no sanctions on our chosen DVs, as well as, where appropriate, group comparisons using the block 1 data in which participants can be compared in the sanction vs. no-sanction data on their first experience of the task in a between-subjects manner (as in block 2, any potential interaction between group and condition would have taken effect, and therefore the nature of any between subjects comparison at this point would have fundamentally been different).

Hypotheses

Naturally, one of the first aims of Study 2 is to replicate the pathway model found in Study 1. Following this, the next set of hypotheses surround the effect that the centralized sanction system was expected to have on proenvironmental behaviour in the LGLT. Herein is where the competing hypotheses derived from SDT and the economic models typically driving sanction system research will be matched against one another. The tenets of SDT posit that external incentives do not necessarily lead to an increase in the target behaviour. Thus, with respect to within-subjects effects, *Hypothesis* $1a_1$, guided by SDT, is that proenvironmental behaviour in the LGLT (measured by the number of fish left in the lake at the end of the task) will, overall, be equal across conditions in a within-subjects comparison. *Hypothesis* $1a_2$, on the other hand, is guided by the prevailing economic models, and predicts that sanctions will have an effect, manifesting in a higher overall mean for the sanction condition compared to the no-sanction condition using a within-subjects design. With respect to the between-subjects effects, based on SDT, we expect that, in the first testing block in which participants are seeing the task

for the first time, the presence of external incentives should not lead to an increase in proenvironmental behaviour for the SSF group compared to the NSF group (*hypotheses* $1b_1$). In contrast, the economic model would expect that the presence of sanctions in Block 1 should lead to a higher mean in proenvironmental behaviour for the SSF group compared to the NSF group (*hypothesis* $1b_2$) when comparing across groups.

The next set of hypotheses surrounds the expected effects of the CSS on personal task-specific motivation and goals. For this, the MTES was adapted to be task-specific to the LGLT, as it was unlikely that two short testing blocks in a virtual, partnered resource dilemma would be able to have an impact on participants' motivation towards *all* of their proenvironmental activities. Instead, the motivation measured for Study 2 (and also Study 3) would be the adapted task-specific motivation indices, which would still capture the same dimensions of motivational quality as the MTES, but would have its items worded towards the specifics of the LGLT. With respect to this, it was expected that, overall, SD task motivation would be lower in the sanction condition compared to the no-sanction condition (*hypothesis 2a*), while NSD task motivation would be higher in the sanction condition compared to the no-sanction condition *(hypothesis 2b*). Similarly, we expected that the pursuit of an intrinsic goal would be lower in the sanction condition compared to the no-sanction condition (*hypothesis 3a*), while the pursuit of extrinsic goals would be stronger in the sanction condition compared to the no-sanction condition (*hypothesis 3b*). Moreover, it was expected that changes in personal task motivation and goals would significantly explain variance in the expected changes in behaviour in the LGLT (*hypothesis 4*).

Lastly, we also wanted to examine the impact of the presence/absence of the CSS on what participants perceive their partner's goal(s) to be in the LGLT. With respect to this, and

based off of the findings of Mulder et al. (2006), we hypothesized that the perception that one's partner is pursuing an intrinsic goal would increase with the addition of sanctions and decrease with the removal of sanctions (*hypothesis 5a*), while the perception that one's partner is pursuing an extrinsic goal would decrease when sanctions are added, but increase when sanctions are removed (*hypothesis 5b*). Similar to Mulder et al., we also hypothesized that changes in participants' inferences about their partner's goal pursuit would significantly explain changes in their own behaviour between the sanction to no-sanction conditions (*hypothesis 5c*). However, we also sought to expand on the assumptions from the Mulder et al. (2006) studies by drawing from SDT, which would predict that a model that includes a person's own internal goals should explain significantly more variance in the target behaviour than a model that only looks at what participants' perceived their partner's goal(s) to be (*hypothesis 5d*).

Method

Participants and Procedure

A sample of first-year university students from a Canadian university enrolled in an introductory psychology course participated in this lab-based study in exchange for a course credit (final sample size N=69). Mean age of participants was 19.45 (SD=1.79) with a range from 18 to 27. The majority of participants were female (n=46), with 20 male participants. With respect to ethnicity, according to self-identification of participants from the ISPR prescreen data, participants were Asian (n=20), Caucasian (n=28), Hispanic (n=1), African-American (n=6), Arabic (n=6) or 'Other' (n=7). There was missing demographic data for gender and ethnicity for 3 participants, and missing data for age for 5 participants.

Participants were invited to a laboratory session through the Integrated System of Participation in Research. On arrival, they were explained the parameters and requirements of

the experiment, and given a consent form to sign before proceeding. Participants were randomly assigned to two groups, which would determine the order or presentation of the two version of the LGLT. As such, one group was called the No-Sanction First (NSF) group, which saw the sanction-free version of the LGLT in Block 1, and the sanction-present version of the LGLT in Block 2. Conversely, the other group was called the Sanction System First (SSF) group, which saw the sanction-present version of the LGLT in Block 1 and the sanction-free version of the LGLT in Block 2. This was done in order to counter-balance the order of presentation of the two task versions. The same deception was used in this study as was used in Study 1.

Participants first completed the MTES on their own. Afterwards, they did 12 practice trials of the LGLT by themselves in order to get oriented with the task, as was done in Study 1. Following this, participants began Block 1, in which they first completed 30 rounds of the LGLT with their inferred partner, with the version of the task used in Block 1 dependent on their group membership. Following the first block of trials in the LGLT, participants completed the Task Motivation Scale, the Strategy Choice in Little Gull Lake Task Scale, the Autonomy Satisfaction Scale, the Task Aptitude Scale, the Perceived Interest-Enjoyment Scale, and the Partner's Perceived Strategy Scale. Once all of these measures were filled out, participants then moved on to Block 2, where the same procedure was repeated except for the change in task version for the LGLT (participants that saw the sanction-free version would then see the sanction-present version, and vice versa). When participants had finished completing the experimental measures for Block 2, they were debriefed about the experimental deception and questioned in a structured interview about their belief in the genuineness of their fake partner. Moreover, they were given an opportunity to ask any questions they may have had regarding the experiment or its deception.

Measures

Motivation Toward Environmental Behaviours. Participants' motivation to perform PEBs in the context of their general lives was assessed using the same scale as was used in Study 1, namely the Motivation Toward the Environment Scale (MTES; Pelletier et al., 1998; see Pelletier, Baxter & Huta, 2011), which has been validated in previous studies (see also Villacorta et al., 2003).

Task Motivation. Participants' levels of self-determined and non-self-determined motivation within the specific context of the LGLT were assessed using an adapted version of the questions on the MTES to be context-specific to the LGLT. Two versions of the Task Motivation Scale (TMS) were created (see Appendix D): one for the version of the task without sanctions, and one for the version of the task that included sanctions. Each version of the scale begins with the same stem, "I chose to act the way I did during the task because…" to which participants give their responses to 18-19 items on a Likert rating scale ranging from 1(Does Not Correspond at All) to 7(Corresponds Exactly). The no-sanction version of the TMS consisted of 18 items, with three items each reflecting the six motivational subscales of SDT. An example of an intrinsic item is "Because I enjoyed seeing the lake flourish"; an example of an integrated item is "I felt like acting that way was consistent with who I am"; an example of an identified item is "I value the health of the environment, so I wanted to act as sustainably as I could in the task"; an example of an introjected item is "I would have been ashamed of myself if I did not throw back enough fish"; an example of an external regulation item is "I felt it was expected of me to act that way"; and finally, an example of an amotivated item is "I don't really know; I didn't really see the point to any of it". The version of the scale created for the LGLT with sanctions present had two additional items, namely "I wanted to get as many of the rewards as I could" and "I wanted to avoid as many punishments as possible", which were used to supplant

the item "the money was quite important to me", which was instead removed for the sanctions version of the questionnaire in order to keep the relative balance of the number of items per subscale as even as possible for both versions. For both the no-sanction and sanction versions of the scale, items corresponding to the intrinsic, integrated and identified motivational subtypes were averaged to form a self-determined motivation index, while items corresponding to the introjected, external regulation and amotivation motivational subtypes were averaged to form a non-self-determined motivation index. For the sanction-free version of the scale, the reliability (as evidenced by Cronbach's Alpha) for the self-determined motivation index was α=.83. The reliability for the non-self-determined index was initially α=.64; however, examination of the alpha values if items were deleted showed that 2 items (item #1 and #6, specifically) were reducing the overall reliability of the non-self-determined subscale. With these items removed, the reliability became α=.73. For the sanction-present version of the scale, the reliability for the self-determined subscale was α=.82, while the reliability for the non-self-determined subscale was α=.76.

Goals. Participants' goals during the LGLT were assessed using the same scale as was used in Study 1, namely the Strategy Choice in the Little Gull Lake Task Scale. The same goal composites that were used in Study 1 were also replicated in Study 2 (see Table 6 and 7).

Partner's Inferred Goals. The Goals questionnaire was adapted in order to tap into participants' inferences of what their fake partners' goals might be, creating the Partner's Perceived Strategy Scale (see Appendix E). As such, the same items in the goals questionnaire used both in Study 1 as well as the present study were replicated; however, the stem was adjusted to read "Listed below are several goals that a person might have while doing the Little Gull Lake Task that you just completed with your partner. Take a moment to reflect on what you think your

partner's goals were during the task". Each item was treated separately, and so no overall reliability was calculated for this scale.

Aptitude. Participants' feelings of knowledge and mastery surrounding the LGLT was assessed using a novel questionnaire created for the purposes of this experiment called the Task Aptitude Scale (see Appendix F). The scale consists of 9 items, with a balance of positively and negatively worded items. The positively worded items were "I knew what I was doing", "I was able to accomplish the goals that I wanted to accomplish", "I understood the task well", "If there was something I did not understand at first, I could figure it out for myself", and "I mastered the task by the time it was finished"; on the other hand, the negatively worded items were "I was not able to achieve the goals I wanted during the task", "I did not feel like I was very good at the task", "I was confused during most of the task", and "I did not really grasp the rules/guidelines of the task as much as I wanted to". Participants gave their responses using a 1(Does Not Correspond at All) to 7(Corresponds Exactly) Likert rating scale. Negatively worded items were reverse scored, and all items were averaged to create an index of participants' feelings of personal competence while conducting the experimental tasks. The overall reliability for the scale for Block 1 was α=.78 and for Block 2 was α=.74.

Perceived Interest and Enjoyment. The degree to which participants felt that the LGLT was engaging and stimulating was assessed using a scale adapted from previous findings regarding feelings of subjective vitality (e.g., Ryan et al., 2010; see Appendix G). The scale consists of 8 items, with a balance of positively and negatively worded items. The positive items were "I felt energized while I was doing the task", "I found it interesting", "I had fun", and "I found it to be engaging/stimulating"; contrastingly, the negative items were "I did not find it very challenging", "I was bored", "I felt drained by the time it was over", and "I thought it was dull".

Participants gave their responses using a 1(Does Not Correspond at All) to 7(Corresponds Exactly) Likert rating scale. Negatively worded items were reverse scored, and all items were averaged to create an index of participants' feelings of interest, engagement and enjoyment while conducting the experimental tasks. Overall reliability for this scale in Block 1 was α=.91, and in Block 2 was α=.90.

Results

Correlations and Descriptives

Means, standard deviations, and inter-variable correlations for all variables are presented in Tables 6 and 7, with the descriptives and correlations for the no-sanctions condition data in Table 6, and the descriptives and correlations for the sanctions condition data in Table 7. Before cleaning the data, any participants who disbelieved the experimental deception to a sufficient degree as to affect their behaviour in the task (as measured via verbal questioning during the experimental debriefing) were subsequently removed from the dataset. However, in the case of Study 2, no participants were removed from the dataset due to this criterion. All variables were checked and cleaned for normality, univariate outliers, and multivariate outliers according to the recommendations of Tabachnick and Fidell (2007). One multivariate outlier was identified using Mahalanobis distances at the .01 significance level, and was consequently removed from the dataset.

Control Checks

Before moving into hypothesis testing, we also examined whether participants were able to fluently understand and master the LGLT by measuring participants' self-reported aptitude with respect to the task, and whether participants were actively engaged in the task during the course of the experiment via ratings of perceived interest and enjoyment. Participants' responses

Table 6

Descriptive Statistics and Correlations between Variables for Study 2 – No-Sanction Condition

Variable	*M*	*SD*	2	3	4	5	6	7
1. PEB in LGLT	4.57	*.85*	.41**	.56**	.001	-.57**	-.42**	.41**
2. SD Task Motivation	2.91	*.71*	-	.36**	.29*	-.29*	-.28*	.22
3. Participants' Intrinsic Goal	3.13	*1.70*		-	.12	-.38**	-.06	.46**
4. NSD Task Motivation	3.72	*2.25*			-	.04	-.04	.02
5. Participants' Extrinsic Goals	3.42	*1.73*				-	.52**	-.14
6. Inference of Partner's Intrinsic Goal	2.37	*1.58*					-	-.31*
7. Inference of Partner's Extrinsic Goal	5.73	*1.39*						-

Note. PEB = Proenvironmental behaviour, measured by the number of fish left in the lake at the end of the task during the testing block using the no-sanction condition. SD = Self-Determined. NSD = Non-Self-Determined.

*p=<.05, **p=<.01

Table 7

Descriptive Statistics and Correlations between Variables for Study 2 – Sanction Condition

Variable	*M*	*SD*	2	3	4	5	6	7
1. PEB in LGLT	172.19	*76.03*	.30*	.45**	-.29*	-.54**	-.26*	.47**
2. SD Task Motivation	4.90	*.95*	-	.29*	.08	-.27*	.08	.19
3. Participants' Intrinsic Goal	3.17	*1.71*		-	-.13	-.44**	.07	.35**
4. NSD Task Motivation	3.39	*.90*			-	.53**	.37**	-.23
5. Participants' Extrinsic Goals	3.12	*1.67*				-	.34**	-.25*
6. Inference of Partner's Intrinsic Goal	3.51	*1.69*					-	-.40**
7. Inference of Partner's Extrinsic Goal	3.22	*1.70*						-

Note. PEB = Proenvironmental behaviour, measured by the number of fish left in the lake at the end of the task during the testing block using the sanction condition. SD = Self-Determined. NSD = Non-Self-Determined.

*p=<.05, **p=<.01

to all items on the Task Aptitude Scale and Perceived Interest-Enjoyment Scale were averaged for each scale individually (with negatively worded items reverse scored) to create an index for each variable (aptitude and interest). The mean for aptitude in the no-sanction condition was M=5.97 (SD=.70), while the mean for the sanction condition was M=6.05 (SD=.64). Moreover, there was no significant difference between conditions on participants' ratings of aptitude [$t(63)$=1.13, p=.262]. Similarly, the mean for interest in the no-sanction condition was M=5.28 (SD=1.03), while the mean for the sanction condition was M=5.33 (SD=1.03). Again, there was no significant difference between conditions on participants' ratings of interest and enjoyment [$t(63)$=.74, p=.465]. As both of these values were well above the mid-point of their respective (1- 7) Likert rating scales, we concluded that participants sufficiently understood the task and were actively engaged in the task in both conditions (sanction and no-sanction) of the experiment. Therefore, their responses could not be attributed to misunderstanding of the task, or to random responding due to low engagement with the task.

Another control check that was performed was to make sure that the two groups (SSF vs. NSF) were not different from each other with respect to participants' general environmental motivation prior to beginning the experiment (i.e., that the groups were equal in general environmental motivation before the experimental manipulation was conducted). In order to test for this, scores from the MTES items were used to create an index for general environmental SD motivation and NSD motivation by averaging responses on items pertaining to the intrinsic motivation, integrated regulation and identified regulation subscales for the SD motivation index, and responses on items pertaining to the introjected regulation, external regulation, and amotivation subscales for the NSD motivation index. These variables were checked for normality (no significant deviations from normality were found), and were used as dependent

variables in two independent-samples T-tests. The results of the t-test examining means for general environmental SD motivation found no significant difference between the SSF and NSF groups [$t(63)=.31$, $p=.758$]. Likewise, the results of the t-test examining means for general environmental NSD motivation found no significant difference between the two groups [$t(63)=1.32$, $p=.191$). Thus, the two groups were equal in their general environmental motivation.

Another check that was done with respect to the data before moving into inference tests was to examine whether scores on the Task Motivation Scale (TMS; both the no-sanctions and sanctions versions of the scale) correlated appropriately with scores on the MTES, as a means of providing some construct validity to the TMS via a convergent validity test between the two scales (as the TMS is new, and the MTES has been previously validated). Thus, we created individual SD and NSD motivation indices for both scales. Results showed that the general environmental SD motivation index for the MTES correlated positively and significantly with the task-specific SD motivation index of the no-sanctions version of the TMS ($r=.61$, $p<.01$) and the sanctions version ($r=.52$, $p<.01$), but did not correlate with the task-specific NSD motivation index for the no-sanctions ($r=.07$, $p=.577$) or sanctions version ($r=.06$, $p=.629$). Similarly, the general environmental NSD motivation index from the MTES correlated positively and significantly with the task-specific NSD motivation index of the no-sanctions version of the TMS ($r=.41$, $p=.001$) and the sanctions version ($r=.39$, $p=.001$), but did not correlate significantly with the task-specific SD motivation index from either the no-sanctions ($r=.17$, $p=.163$) or the sanctions version ($r=.12$, $p=.358$) of the TMS. Thus, we considered that the test of convergent validity was successful, and therefore that the construct validity of the TMS could be appropriately assumed to be true. Moreover, while the correlations between similar constructs (e.g., self-determined motivation towards overall environmental behaviours and self-determined

motivation towards maintenance of the fish population in the LGLT) were significant, they were also moderate, indicating that there was not significant multicollinearity, i.e., that we had not simply measured the exact same thing twice. The fact that the correlations were not overly strong indicates that the constructs are still respective to the different contexts, namely, general and task-specific respectively.

Inference Tests

Information regarding cell means for all of the inference tests can be found in Table 8.

Replication from Study 1 of Main Studies

The first test we performed was to replicate the pathway model that was evidenced in Study 1 of the main studies of this thesis. To do this, participants' scores on all variables were collapsed across groups, so that every participant had a "sanction" and "no-sanction" index for all relevant variables, regardless of group. The reason for doing this was to (a) replicate the same conditions of the LGLT as were used in the original Study 1 analysis, and (b) in order to maximize the statistical power of the mediation analysis. The "no-sanction" indices were used in the replicated model test, which was done using the bootstrapping MEDIATE macro from Preacher and Hayes (2004; 2008; Hayes & Preacher, 2014). The number of fish left in the lake at the end of the task was used as the dependent variable (Y), separate indices for SD and NSD task motivation were used as the independent variables (X's), and goals were used as mediators (M's).

With respect to the X's predicting M's, it was found that SD task motivation was a significant negative predictor of extrinsic goals (coeff.=-.55, $t(62)=2.56$, $p=.012$); conversely, SD task motivation was a positive predictor of having an intrinsic goal (coeff.=.59, $t(62)=2.87$, $p=.006$). On the other hand, NSD task motivation was a significant positive predictor of reactive

Table 8

Cell Means for Each Group by Condition for Study 2

		Condition	
Variable	**Group**	Sanctions	No-Sanctions
Proenvironmental Behaviour in LGLT	SSF	153.5(*67.71*)	136.5(*60.44*)
	NSF	195.87(*80.42*)	135.63(*85.76*)
SD Motivation	SSF	4.82(*.95*)	4.98(*1.06*)
	NSF	5.00(*.95*)	4.71(*.86*)
NSD Motivation	SSF	3.56(*.85*)	3.08(*.85*)
	NSF	3.18(*.93*)	3.03(*.86*)
Intrinsic Goal	SSF	2.69(*1.35*)	3.14(*1.42*)
	NSF	3.76(*1.94*)	3.17(*1.87*)
Extrinsic Goals	SSF	4.04(*1.47*)	3.40(*1.51*)
	NSF	2.66(*1.74*)	2.78(*1.82*)
Perception of Partner's Intrinsic Goal Pursuit	SSF	3.80(*1.62*)	3.03(*1.69*)
	NSF	3.14(*1.75*)	2.86(*1.89*)
Perception of Partner's Extrinsic Goal Pursuit	SSF	2.68(*1.37*)	3.58(*1.63*)
	NSF	3.86(*1.87*)	3.55(*1.86*)

Note. Information presented in reg. font represents the means, while information presented in italics in parentheses represent the standard deviations.

goals (coeff.=.50, $t(62)=2.17$, $p=.034$. All other relationships were non-significant (p's >.05).

With respect to X's and M's predicting Y (when controlling for each other), the omnibus ANOVA was significant ($F[5,59]=11.76$, $p<.001$) and explained 50% of the variance in the dependent variable. It was found that extrinsic goals [coeff.=-16.82, $t(59)=3.69$, $p<.001$], and having an intrinsic goal [coeff.=15.90, $t(59)=3.44$, $p=.001$] were both significant predictors of participants proenvironmental behaviour in the LGLT.

Lastly, significant indirect effects (as evidenced by the 95% confidence interval LLCI and ULCI not passing through zero) of SD task motivation on proenvironmental behaviour were found through the extrinsic goals (coeff.=9.27, s.e=4.56, LLCI=1.68, ULCI=20.00), and having an intrinsic goal (coeff.=9.38, s.e.=5.40, LLCI=1.72, ULCI=24.00), though no indirect effects were found for NSD on proenvironmental behaviour through any of the mediators. The results demonstrate that higher SD motivation predicted lower extrinsic goal strength, which predicted higher amounts of fish left in the lake at the end of the task. Moreover, higher SD motivation predicted higher intrinsic goal strength, which, in turn, predicted higher amounts of fish left in the lake at the end of the task. Thus, two of the three indirect effects from the original pathway model found in Study 1 were replicated in Study 2.

Proenvironmental Behaviour in the LGLT

Hypotheses 1a-b. The first set of hypotheses surrounded the effect that the CSS would have on participants' proenvironmental behaviour in the LGLT. Since the main objectives of this study were to examine the effect of condition (sanction vs. no-sanction) on various outcomes, we first collapsed the data so that all participants had 'sanction condition' and 'no-sanction condition' data on all relevant variables. Following this, we conducted a 2(condition) x 2(group) mixed-factorial ANOVA with condition (sanction vs. no-sanction) as the within-subjects factor

(as all participant went through both the sanction and no-sanction conditions across time) and group membership [sanction-system-first (SSF) and no-sanction-first (NSF)] as the between-subjects factor. Any significant interaction would demonstrate that order of presentation had a significant impact on the effect of condition on the dependent variable. For the first analysis, the number of fish left in the lake at the end of the task was used as the dependent variable, and was taken to demonstrate participants' level of proenvironmental behaviour in the LGLT. The results showed a significant interaction between condition and group [$F(1,66)=18.57$, $p<.0005$] with an effect size of $\eta_p^2=.22$. The main effect of condition was also significant [$F(1,66)=59.25$, $p<.0005$] with an effect size of $\eta_p^2=.47$; however, the main effect of group was not significant [$F(1,66)=1.47$, $p=.230$]. With respect to the simple effects for the between-subjects contrasts, the results showed that, in the sanction condition, there was a significant difference between groups (Mean Diff.=42.34, Std. Err.= 17.97, $p=.021$) with a lower mean for the SSF group ($M=153.5$, $SD=67.71$) than the NSF group ($M=195.87$, $SD=80.42$). There was no significant difference between the SSF group ($M=136.5$, $SD=60.44$) and the NSF group ($M=135.63$, $SD=85.76$) in the no-sanction condition. With respect to the simple effects for the within-subjects contrasts, the results showed that, for the NSF group, there was a significant increase in proenvironmental behaviour from the no-sanction to the sanction condition (Mean Diff.=60.23, Std. Err.=7.50, $p<.0005$). For the SSF group, there was also a significant decrease from the sanction to the no-sanction condition (Mean Diff.=17.0, Std. Err.=6.67, $p=.013$). Thus, *hypotheses* $1a_2$ was supported by the data.

We also conducted one further contrast in which we compared the mean level of proenvironmental behaviour of participants in the NSF and SSF groups Block 1, in order to compare how the presence/absence of the CSS may have affected behaviour during the first

exposure of participants to the task. In other words, we sought to examine if, during the initial presentation of the task, the presence of sanctions led to an increase in proenvironmental behaviour in the LGLT. To test this, we conducted a independent samples T-test, using the mean number of fish left in the lake at the end of the Block 1 testing phase as the DV, and group membership (NSF vs. SSF) as the independent variable. The results showed no significant difference between the groups during the initial testing phase (t[66]=.94, p=.352). Thus, *hypothesis* $1b_1$ was supported by the data.

Personal Motivation and Goals

Hypotheses 2a-b. The next pair of hypotheses dealt with the effect of sanctions on personal motivation. To test these hypotheses, we conducted a series of mixed-factorial ANOVAs identical to the one used to test *hypotheses 1a-1b*, though with different dependent variables. The first interaction test used the SD task motivation index as the dependent variable. The results showed a significant interaction between condition and order of presentation [F(1,63)=11.37, p=.001] with an effect size of η_p^2=.15 . Results showed no significant main effect of condition [F(1,63)=.83, p=.365] or group [F(1,63)=.03, p=.858]. Examination of the simple effects for the between-subjects contrasts showed that, in the sanction condition, there was no significant difference between the SSF group (M=4.82, SD=.95) and the NSF group (M=5.00, SD=.94); similarly, in the no-sanction condition, there was no significant difference between the SSF group (M=4.98, SD=1.06) and the NSF group (M=4.71, SD=.86). With respect to the simple effects for the within-subjects contrasts, results showed that, for the SSF group, the change between the sanction and no-sanction conditions was non-significant (Mean Diff.=.17, Std. Err.=.09, p=.071); meanwhile, for the NSF group, the results showed a significant increase in SD task motivation between the sanction and no-sanction condition (Mean Diff.=.29, Std.

Err.=.10, p=.005). Examination of the direction of the within-subjects differences for the SSF and NSF group (which occurred in opposite directions), in combination with the lack of between-subjects differences in the simple effects contrasts suggested a main effect of Time, as the no-sanction condition for the NSF group would have occurred at Time 1 while the sanction condition would have occurred at Time 2, and vice versa for the SSF group. Thus, a post-hoc test was done in order to corroborate this hypothesis. Another mixed-factorial ANOVA was conducted using Time (Block 1 vs. Block 2) as the within-subjects factor instead of condition. The results of this analysis showed a significant main effect of Time [F(1,63)=11.35, p=.001], though no significant interaction or main effect of group. Thus, *hypothesis 2a* was not supported by the data. Instead, SD motivation increased across time as a function of the repetition of the LGLT.

To test *hypothesis 2b*, we conducted another 2(condition: sanction vs. no-sanction) x 2(group: SSF vs. NSF) mixed-factorial ANOVA using the NSD task motivation index as the DV. The results of this analysis showed no significant interaction between condition and group [F(1,63)=3.68, p=.06]. Examination of the main effects showed a significant main effect of condition on NSD task motivation [F(1,63)=13.79, p<.0005] with an effect size of η_p^2=.18, with the mean in the sanction condition (M=3.39, SD=.92) being higher than the mean in the no-sanction condition (M=3.06, SD=.85). No significant main effect of group emerged [F(1,63)=1.15, p=.287]. Thus, *hypothesis 2b* was supported by the data, and the null hypothesis was rejected.

Hypotheses 3a-b. The next pair of hypotheses surrounded the effect of condition on personal goals in the LGLT. Another mixed-factorial ANOVA identical to the ones previously conducted was used to test this hypothesis, with participants' self-reported ratings of their

strength of pursuit of the intrinsic goal as the DV. The results showed a significant interaction between condition and group [$F(1,63)=11.95$, $p=.001$] with an effect size of $\eta_p^2=.16$. No main effects for condition [$F(1,63)=.23$, $p=.636$] or group [$F(1,63)=2.09$, $p=.154$] emerged from the results. With respect to the simple effects for the between-subjects contrast, the results showed a significant difference (Mean Diff.=1.06, Std. Err.=.41, $p=.011$) between the SSF group ($M=2.69$, $SD=1.35$) and the NSF group ($M=3.76$, $SD=1.94$) in the sanction condition, with a higher mean for the NSF group than the SSF group in this condition; however, there was no significant difference between the SSF group ($M=3.14$, $SD=1.42$) and the NSF group ($M=3.17$, $SD=1.87$) with respect to the no-sanction condition. For the simple effects for the within-subjects contrasts, the results showed that, for the SSF group, there was a significant increase in intrinsic goal pursuit between the sanction and no-sanction condition (Mean Diff.=.44, Std. Err.=.20, $p=.029$). Moreover, for the NSF group, there was a significant increase between no-sanction and sanction conditions (Mean Diff.=.59, Std. Err.=.22, $p=.010$). Thus, *hypothesis 3a* was partially supported by the data, though the expected relationship depended on the order of presentation. The pursuit of an intrinsic goal was stronger in the no-sanction condition compared to the sanction condition for the SSF group, which was in line with our expectations; however, pursuit of an intrinsic goal was lower in the no-sanction condition compared to the sanction condition for the NSF group (see Table 7 for cell means and standard deviations). Moreover, participants who saw the sanction condition in Block 2 had stronger intrinsic goal pursuit in the sanction condition than participants who saw this condition in Block 1.

To test *hypothesis 3b*, we conducted an identical mixed-factorial ANOVA using self-reported levels of participants' pursuit of the extrinsic goals as the DV. The results of this analysis showed a significant interaction between condition and group [$F(1,63)=12.52$, $p=.001$]

with an effect size of η_p^2=.17. Looking at the main effects, the results showed a significant main effect of condition on extrinsic goal pursuit [F(1,63)=4.12, p=.046] with an effect size of η_p^2=.09, with a higher mean for the sanction condition (M=3.42, SD=1.73) compared to the no-sanction condition (M=3.12, SD=1.67). The main effect of group was also significant [F(1,63)=6.65, p=.012] with an effect size of η_p^2=.10, with a higher overall mean for the SSF group (M=3.72, SD=1.49) than the NSF group (M=2.72, SD=1.78). With respect to the simple effects for the between-subjects contrasts, the results showed a significant difference between the SSF group (M=4.04, SD=1.47) and the NSF group (M=2.66, SD=1.74) in the sanction condition (Mean Diff.=1.39, Std. Err.=.40, p=.001), but no significant difference between the SSF group (M=3.40, SD=1.51) and the NSF group (M=2.78, SD=1.82) in the no-sanction condition. For the simple effects for the within-subjects contrasts, the results showed that, for the SSF group, there was a significant decrease in extrinsic goal pursuit between the sanctions and no-sanction conditions (Mean Diff.=.64, Std. Err.=.14, p<.001); however, there was no significant difference between conditions for the NSF group. Cell means can be seen in Table 8. Thus, *hypothesis 3b* was supported by the data, and the null hypothesis was rejected.

Hypothesis 4. This hypothesis dealt with explaining the change in behaviour in the LGLT across conditions by using corresponding changes in personal task motivation and goals as predictors. To test this, we created difference scores by subtracting each participants' no-sanction condition data from their sanction condition data on each of the relevant variables (number of fish left in the lake at the end of the task, SD task motivation, NSD task motivation, intrinsic goal pursuit and extrinsic goal pursuit). The change scores for SD task motivation, NSD task motivation, intrinsic and extrinsic goal pursuit were used as predictors, while the change score in the number of fish left in the lake was used as the DV in a multiple linear regression.

The omnibus ANOVA was significant [$F(4,60)=2.62$, $p=.043$] with an effect size of $R^2=.15$. With respect to the individual predictors, change in intrinsic goal pursuit strength was the only significant predictor when controlling for all other variables (Std. β=.30, $t=2.48$, $p=.016$). Thus, the larger the change in intrinsic goal pursuit strength between the conditions, the larger the change in behaviour, such that the larger the drop in strength of participants' pursuit of the intrinsic goal of returning as many fish to the lake as possible every round regardless of total earnings, the larger the drop in the number of fish left in the lake from the sanction to the no-sanction conditions, and vice versa. Thus, *hypothesis 4* was supported by the data, as 15% (a moderate effect size) of the variance in participants' change in behaviour between conditions can be significantly explained by corresponding changes in intrinsic goal pursuit.

Inferences of Partner's Goals

Hypotheses 5a-d. The last set of hypotheses surrounded the effect that the CSS would have on participants' inferences about their fake partner's goal(s). For *hypotheses 5a* and *5b*, we conducted a pair of 2(condition: sanction vs. no-sanction) by 2(group: SSF vs. NSF) mixed-factorial ANOVAs. In order to reduce the complexity and number of analyses performed, we chose to use two representative goals as DVs that exemplified the categories of intrinsic and extrinsic goals that were mirror images of participants' own personal goals: namely, how much participants thought their fake partner was pursuing the goal of returning as many fish to the lake as they could each round regardless of total earnings (intrinsic), and the goal of making the most money they could every round (extrinsic). Recall that the fake participant acted in a constrained and consistent manner across conditions, throwing back a randomly generated number of fish between 17 and 23 in both conditions, thus neither acting overly sustainable, nor making large amounts of money.

The results of the mixed-factorial ANOVA using partner's inferred intrinsic goal pursuit as the DV demonstrated a non-significant interaction between condition and group [$F(1,62)=1.59$, $p=.212$). Examination of main effects showed a significant main effect of condition [$F(1,62)=7.10$, $p=.010$] with an effect size of $\eta_p^2=.10$. Examination of the means showed that the mean for the sanction condition was higher ($M=3.50$, $SD=1.70$) than the mean for the no-sanction condition ($M=2.95$, $SD=1.77$). Thus, *hypothesis 5a* was partially supported by the data, as condition did have an effect on inference of partner's intrinsic goal pursuit; however, this relationship occurred in the same direction for both groups regardless of order of presentation.

The results of the mixed-factorial ANOVA using inferred extrinsic goal pursuit as the DV demonstrated a significant interaction between condition and group [$F(1,63)=8.38$, $p=.005$] with an effect size of $\eta_p^2=.12$. Examination of the main effects showed no significant main effect of condition [$F(1,63)=1.95$, $p=.168$], or of group [$F(1,63)=2.45$, $p=.122$]. With respect to the simple effects for the between-subjects contrasts, results showed a significant difference (Mean Diff.=1.17, Std. Err.=.40, $p=.005$) between the SSF group ($M=2.69$, $SD=1.37$) and the NSF group ($M=3.86$, $SD=1.87$) in the sanction condition, though there was no significant difference between the SSF group ($M=3.58$, $SD=1.63$) and the NSF group ($M=3.55$, $SD=1.86$) in the no-sanction condition. With respect to the simple effects of the within-subjects contrasts, results showed a significant increase (Mean Diff.=.89, Std. Err.=.28, $p=.002$) between the sanction condition and no-sanction condition for the SSF group. No significant difference between conditions was found for the NSF group. Thus, *hypothesis 5b* was also partially supported by the data, in that participants' inference that their partner was pursuing an extrinsic goal did not decrease when sanctions were added, but did increase when sanctions were removed.

Hypothesis 5c and *5d* anticipated that changes in inferences about the fake partner's goals across conditions would be predictive of corresponding changes in participants' own proenvironmental behaviour (*5c*), but that the model including participants' personal goals would be significantly stronger (*5d*). To test these, we first created difference scores for the participants' inferences about their partner's goals in the same way that difference scores were created for the purposes of testing *hypothesis 4*. Next, we conducted a stepwise regression wherein changes in participants' inferences about their fake partner's goals across conditions were used as predictors in Block 1, while in Block 2 changes in participants' personal goals (intrinsic and extrinsic) would be added to the model as predictors. The dependent variable was the change score in the number of fish left in the lake at the end of the task across conditions (Sanction Condition – No-Sanction Condition = Difference). With respect to Block 1, the omnibus ANOVA was significant [$F(1,62)=6.00$, $p=.017$] with an effect size of $R^2=.09$. Looking at the individual predictors, the results show that changes in the inference that one's partner was pursuing an extrinsic goal was a significant positive predictor (Std. $\beta=.30$, $t=2.45$, $p=.017$) of changes in participants' own behaviour in the LGLT across conditions, while changes in the inference that one's partner was pursuing an intrinsic goal was not a significant predictor of the DV. With respect to Block 2 of the stepwise multiple regression, the results showed a significant R^2-change [F-Change$(2,60)=3.98$, $p=.024$] with an R^2-Change of .11. The omnibus test for model 2 was significant [$F(3,60)=4.84$, $p=.004$) with an effect size of $R^2=.20$. Examination of the individual betas in Block 2 showed that only changes in participants' own pursuit of an intrinsic goal was a significant positive predictor (Std. $\beta=.32$, $t=2.65$, $p=.01$) of the DV. All other predictors were non-significant. Thus, *hypothesis 5c* and *5d* were both supported by the data.

Discussion

The overall objective of Study 2 of the main studies of this thesis was to examine the impact that the presence of a centralized sanctioning system would have on participants' proenvironmental behaviour in the LGLT, personal motivation and goals, and what they perceive their fake partner's goal(s) to be. On the one hand, economic models predict that sanctioning systems should improve cooperative behaviour in a social dilemma without cost to the individual, while on the other hand SDT predicts that external incentives will degrade self-determined motivation, and intrinsic goals, leading to sub-optimal outcomes over time. Moreover, past research (Chen et al., 2009; Mulder et al., 2006; Tenbrunsel et al., 1999) has suggested that the presence of a centralized sanctioning system can lead participants to assume that others in the dilemma are motivated to pursue extrinsic goals, thereby reducing trust in others and consequently reducing cooperative behaviour in the dilemma. While past research assumed the drop in trust was because of the inference that others in the dilemma are motivated to pursue extrinsic goals (while taking self-reported measures of trust), the current study sought to provide direct evidence to this assumption.

The pathway model uncovered by the mediational analysis in Study 1 was replicated in Study 2 using the collapsed no-sanctions condition data and the task-specific adapted measure of motivation. SD task motivation was found to be a positive predictor of having an intrinsic goal, as well as a negative predictor of the extrinsic goals, as was found in Study 1. In addition, NSD task motivation was found to be a positive predictor of reactive goals. This relationship was not found in Study 1 when general environmental motivation was used as the predictor variables, suggesting that using a more specific form of measuring motivation is better suited to identifying relationships between NSD motivation and personal goals in a resource dilemma. Moreover, the overall model of X's and M's predicting Y showed that, taken together, task motivation and

goals can explain 50% of the variance of participants' proenvironmental behaviour in the LGLT. In addition, the same indirect effects found in Study 1 were replicated in Study 2, with the exception of the indirect effect of SD motivation on PEB in the LGLT through reactive goals, which was not found in Study 2 when using the task-specific motivation measure. In addition, no direct negative relationship between NSD task motivation and proenvironmental behaviour in the LGLT was found in the task-specific model, nor were any indirect effects found. Nevertheless, the fact that essentially the same model was uncovered by both a generalized environmental motivation measure and a task-specific one is a promising result. The relationship between SD motivation, increasing intrinsic goal strength and decreasing extrinsic goals' strength, and acting more proenvironmentally in the LGLT held true in both models, and shows a stable pathway model.

In Study 2, we examined the effect of a CSS on proenvironmental behaviour in the LGLT. Overall, the presence of a CSS initially had a positive effect on participants' proenvironmental behaviour in the LGLT when examining within-subjects effects, as indicated by a 26.5% increase in the number of fish left in the lake in the sanction condition compared to the no-sanction condition. Using within-subjects contrasts, we found that adding the CSS increased proenvironmental behaviour, while removing the CSS decreased proenvironmental behaviour, with the latter corroborating previous studies (e.g., Mulder et al. 2006). By examining the simple effects in more detail than previous studies that sought to identify potential negative effects of a CSS, we were able to uncover additional trends that have not been identified before, namely, that the positive effect of the presence of a CSS may depend on the timing in which is it presented. When participants are first exposed to a resource dilemma in which a CSS is present, it does not necessarily lead to increased proenvironmental behaviour in the dilemma

compared to participants who are first exposed to the dilemma without the presence of a CSS, as shown in the between-subjects contrast of groups in Block 1 of testing. The largest positive effect of a CSS seems to occur when participants are first allowed to conduct the resource dilemma without the CSS included, and then have the CSS subsequently added, as indicated by the fact that, in the sanction condition, the NSF group had a significantly higher mean than the SSF group. Interestingly, however, in the no-sanction condition, the means of the two groups were almost perfectly identical in this study, showing that behaviour in the no-sanction condition was the same regardless of the order of presentation. Moreover, this shows that the effect of sanctions does not last beyond the presence of the CSS, as the SSF mean in the no-sanction condition was identical to the NSF mean in the same condition (showing, in essence, a return to baseline behaviour when sanctions are removed). Thus, it appears that it is important to first allow participants the chance to understand the task, their personal motivation and goals, and their partner's behaviour and goals before establishing a CSS in the dilemma; when this is done, the addition of the CSS is significantly more amplified. A likely explanation is that this order of presentation leads to an increase in overall motivation, both quality and quantity, therefore increasing overall proenvironmental behaviour in the task. The idea of mixed motivations improving performance has been seen in other areas as well, such as the education domain (e.g., Boiché, Sarrazin, Grouzet, Pelletier & Chanal, 2008; Ratelle, Guay, Vallerand, Larose & Senecal, 2007).

The competition between the hypotheses of the dominant economic model and the humanistic SDT model showed that a blending of the two approaches seems best. Sanctions can increase proenvironmental behaviour, but only after participants have been able to experience the task autonomously first without a CSS present. Another piece of evidence for this supposition is

the fact that, in general, intrinsic goal pursuit increased over time as a function of repetition of the task; however, in the sanction condition the NSF group had a higher mean than the SSF group, showing that, if first allowed to conduct the task autonomously without external incentives before having a CSS added afterwards, it can have a differentially positive impact on intrinsic goal pursuit above and beyond the effect of time alone. In line with this, and with SDT in general, the larger the increase in intrinsic goal pursuit, the larger the increase in proenvironmental behaviour across conditions as well (and vice versa), as the only significant predictor of change in behaviour across conditions was change in participants' intrinsic goal pursuit.

We also conducted several analyses to uncover the nature of the effect of a CSS on SD task motivation, as well as NSD task motivation and extrinsic goal pursuit. The results showed that SD task motivation was unaffected by the CSS, regardless of overall condition or order of presentation. In contrast, as can be seen in the results showing a significant main effect of condition on NSD task motivation, changes in the external context affects motivation that is not yet internalized, or still in the process of being fully internalized. In this case, the presence of a CSS can have a detrimental effect by increasing NSD task motivation and extrinsic goal pursuit, as would be predicted by SDT.

In addition, we sought to provide direct evidence of the interesting supposition in the Mulder et al. (2006) article, wherein the authors posited that the reason for the drop in trust when a CSS was removed was because of the assumption by participants that their partner was externally motivated, an assumption that was buffered by the presence of the CSS and then amplified when the CSS was removed. Because trust was higher in the sanction condition compared to the no-sanction condition in the Mulder et al. study (hence there was a *decrease* in

trust when sanctions were removed), we also anticipated that participants' inference about their partner`s intrinsic goal pursuit would be higher in the sanction compared to no-sanction condition, which was supported in the results via a main effect of condition on this DV, with a higher mean in the sanction condition. Conversely, we expected the opposite to be true for participants' inference about their partner's extrinsic goal pursuit: namely that it would be lower in the sanction condition, and higher in the no-sanction condition. This was partially supported by the data, in that the SSF group showed an increase in this DV when sanctions were removed in the Block 2 testing, which corroborated the results from the Mulder et al. (2006) study. However, there was no decrease for the NSF group when sanctions were added in Block 2. Moreover, there was an effect of order of presentation on this, such that when the sanction condition was seen first compared to second, there was a lower inference by participants that their partner was pursuing an extrinsic goal within the sanction condition. While previous research examined only one direction, namely the order of presentation for the SSF group in our experiment, we tested both directions and found differential results, demonstrating that the effect of sanctions on inferences of others' extrinsic goal pursuit may depend on the whether they have previously conducted the task with that/those partner(s) without the sanctions present.

Furthermore, while we were able to corroborate the assumptions drawn from the Mulder et al. article, it was our hypothesis that changes in participants' perception of partner's goal pursuit alone would not provide as strong an explanation for concurrent changes in behaviour across experimental conditions as a model that also included changes in participants' own personal goals, in line with SDT and with the overarching purpose of this article to demonstrate the importance of considering intraindividual motivation and goals when examining behaviour in a resource dilemma. The results of this study supported this hypothesis. A model only looking at

changes in participants' inferences about their partner's goals showed that changes in the inference that one's partner was pursuing an extrinsic goal was predictive of changes in participants' own behaviour. However, when participants' personal goals are added to the model, it explains significantly more variance, and only changes in participants own intrinsic goal pursuit was predictive of changes in behaviour across conditions in the full model.

Study 3

Study 1 provided foundational evidence that personal motivation and goals are predictive of interpersonal cooperation over a finite natural resource in an iterated, partnered, micro-world resource dilemma. Study 2 expanded on this by introducing a centralized sanction system into the task, and examining the impact that such had on personal motivation, goals, and inferences about what goal(s) one's partner was attempting to pursue. The results of such examination demonstrated the short-term positive behavioural impact of a centralized sanction system (CSS) on proenvironmental behaviour in the LGLT; but, it also demonstrated the potential longer term detriment to personal motivation and goals through increased NSD motivation and extrinsic goals, and through changes in perception of others' goals such that these perceptions become more suspicious of others' genuine desire to maintain the health of the resource. Moreover, the positive behavioural effects did not sustain past the removal of the sanctioning system. Overall, this work examined the impact of top-down pressure from an overarching system meant to impose behavioural constraints on insufficiently sustainable behaviour, as well as rewards for behaviour that exceeded mere sustainability and went beyond such into the realm of resource growth.

Study 3 was meant as a complementary study to the previous main studies of this thesis by examining the impact of the presence of a decentralized sanction system (DSS) on interpersonal behaviours in the LGLT. A decentralized sanction system is a system in which fines and rewards can be administered to participants by other participants for not acting cooperative or for acting appropriately or beyond appropriately cooperative, respectively. Where the CSS exerted a top-down pressure on participants, the DSS allows participants to exert bottom-up influence on one another. In the case of the present study, this was done by

examining how participants' personal motivational quality may be predictive of how they will attempt to exert an influence over an inferred partner. Such an investigation would, in essence, be the first of its kind; moreover, in compliment of Study 2, it would complete the picture of the relationships between sanctioning systems, personal motivation and goals, and interpersonal behaviour in a resource dilemma.

More specifically for the advancing of knowledge in SDT, this research can uncover the relationship between motivation and interpersonal behaviours in a rather unique social context in which the participants are essentially peer-status, and the consequences of their interactions can be severe for the natural environment (though, of course, for the purposes of this experiment we will be using a virtual resource). With respect to the knowledge base for social dilemmas as a whole, this research aims to fill in a rather glaring gap in knowledge with respect to a veritable lack of studies investigating intraindividual motivation and how it relates to performance and outcomes in a social dilemma, with and without any type of sanction system.

Moreover, this experiment has real-world application as well. While the use of centralized sanction systems in laboratory experiments is generally seen as having greater external validity and application than decentralized ones – since most environmental interventions are done by government organizations, this is much more akin to a centralized sanction system than a decentralized one – the truth is that, once positive and negative feedback are understood as another form of possible incentive, one that can enhance or undermine, for example, intrinsic motivation (Deci, Koestner & Ryan, 1999), we can see that decentralized sanction systems, in essence, already exist in resource dilemmas in the real world. That is, decentralized sanction systems, in this sense, represent the social sanctions that any given person is able to give to another in a real-world resource dilemma. Moreover, centralized systems

usually also involve a decentralized aspect as well. In other words, government interventions don't tend to only rely on government officials to discover and punish environmentally damaging behaviours. Instead, these systems also tend to encourage citizens to inform officials about people they have seen violating environmental legislation. For example, in Ontario, government officials from the Ministry of Natural Resources actively patrol lakes and rivers in order to ensure that recreational fisherman have valid, appropriate licenses, and are not going over their catch limit (similar to a centralized sanction system). However, since these officials cannot be everywhere at once, the Ministry of Natural Resources also seeks the support of citizens to report resource abuse by fellow citizens to the appropriate authorities, which is more akin to participants punishing other participants in a decentralized sanction system. Thus, the two systems can work in concert, rather than being mutually exclusive in the real world. As such, understanding the complete picture of the relationship between motivation, goals and sanctioning systems requires using both types of sanction systems, not just for fundamental purposes, but for applied ones as well.

With respect to this specific study, the decentralized sanction system used will afford participants the ability to attempt to influence their inferred partner's behaviour within the task via (1) in-task monetary fines, (2) in-task monetary rewards, (3) pre-written communication meant to control the other person's behaviour, (4) pre-written communication meant to provide positive feedback, and (5) pre-written communication of an autonomy supportive nature meant to encourage greater proenvironmental behaviour without the presence of behavioural control.

Hypotheses

Based on previous research on sanctions, communication and SDT, as well as the results from the previous studies presented and discussed herein, we expected that proenvironmental behaviour in the LGLT would be higher in the sanction condition compared to the no-sanction condition (*hypothesis 1*). Since the presence/removal of a centralized sanction system was shown to have an effect on NSD motivation, intrinsic and extrinsic goals, as well as inferences about what goals (intrinsic or extrinsic) one's partner is pursuing, we wanted to replicate the analyses done in Study 2 using the same DVs in order to determine if a decentralized sanction system can also have a effect on behaviour, personal motivation and goals, and inferences about one's partner's goals. Previous research has shown that providing people with choice in a given activity can enhance satisfaction of the need for autonomy, thereby increasing intrinsic motivation, through the mechanism of increasing a person's feelings of having an internal locus of causality – that is, by increasing the perception that one's actions are self-generated, and that any outcomes derived from such can be attributed to one's own motivation and actions, rather than to someone else's or to other external factors (see Deci & Ryan, 2000). So, while a centralized sanction system uses incentives to externally guide the behaviour of participants in a social dilemma, thereby imposing controls on participants and creating the feeling of limiting possible actions and choice, a decentralized system offers the opposite. That is, as a decentralized system allows participants more available possible actions during the LGLT, and because participants can always opt to not participate in sending messages or monetary incentives to their inferred partner, we predicted that the presence of the decentralized system should conceivably increase SD task motivation (*hypothesis 2a*), and decrease NSD task motivation (*hypothesis 2b*). Congruently, we expected that intrinsic goal pursuit should be higher in the sanction condition than the no-sanction condition (*hypothesis 3a*), while extrinsic

goal pursuit should be higher in the no-sanction condition compared to the sanction condition (*hypothesis 3b*). In addition, with respect to participants' inferences about their fake partner's goals, we hypothesize that the provision of the ability to influence one's partner in the decentralized sanction system will lead to a higher perception of one's partner pursuing an intrinsic goal in the sanction compared to the no-sanction condition (*hypothesis 4a*), while perception of one's partner pursuing an extrinsic goal should be lower in the sanction compared to the no-sanction condition (*hypothesis 4b*).

In addition to these hypotheses, the main objective of this article is to examine the relationships between personal task motivation, inferences about what goal(s) one's partner is trying to pursue, and the means by which participants attempt to influence their partner in the sanction condition of the LGLT. With respect to this, several additional hypotheses were formulated. We expected that SD task motivation would be positively related to the use of positive feedback messages and autonomy supportive messages (*hypothesis 5a*), but would be negatively related to the use of monetary fines and rewards (*hypothesis 5b*). In contrast, we expected NSD task motivation would be negatively related to the use of positive feedback and autonomy supportive messages (*hypothesis 5c*), but would be positively related to the use of monetary fines and rewards (*hypothesis 5d*). In other words, overall, we expected participants to use means of influence that were congruent with their own personal motivation, such that participants whose task motivation was self-determined would use autonomy-supportive means of influence via positive communication, while participants whose task motivation was more non-self-determined would use more extrinsically-oriented, controlling means of influence via monetary rewards and fines.

Similar to Study 2, in which changes in participants' inferences about their partner's goals were used as predictors of their own corresponding changes in behaviour across conditions, we also wanted to explore the hypothesis that participants' inferences about their partner's goals would also be related to how they attempted to influence them in a decentralized sanction system. Because previous research in this area was done using a centralized sanction system, and not a decentralized one, and because research in SDT does not necessarily have a strong theoretical guide as to the directionality of the relationship between inferences about what goals one's confederates are pursuing and how they will attempt to influence them, we decided to use a two-tailed hypothesis in order to guide the analyses relevant to this section of inference testing. That is, we expected that there would, overall, be a significant relationship between participants' inferences about their partner's goal(s) and how they attempted to influence them during the sanction condition of the LGLT (*hypothesis 6*).

Method

Participants and Procedure

A sample of first-year university students from a Canadian university enrolled in an introductory psychology course participated in this lab-based study titled "Go Fish! Motivation and Cooperation" in exchange for a course credit (final sample size N=59). 2 participants were removed from the data due to insufficient belief in the experimental deception leading to altered behaviour (as indicated by verbal self-report from the participants during the debriefing procedure at the end of the experiment). Mean age of participants was 19.29 (SD=1.48) with a range from 17 to 25 (1 missing). The majority of participants were female (n=36), with 22 male participants (1 missing). With respect to ethnicity, according to self-identification of participants

from the ISPR prescreen data, participants were Asian (*n*=10), Caucasian (*n*=34), African-American (*n*=2), Arabic (*n*=3) or 'Other' (*n*=8; missing = 1).

The procedure for this study was identical to that of previous studies using the LGLT (see Study 1 and Study 2 of this thesis), with minor exceptions. To begin with, the length of the LGLT was reduced from 30 rounds per block to 20 rounds per block, in order to further decrease cognitive fatigue in participants that might occur as a result of the longevity of the testing session required for the study. Moreover, and more notably, Study 3 used a decentralized sanction system, rather than a centralized one. In the decentralized sanction system, participants saw a new screen after every fourth round (i.e., after the 4th, 8th, 12th and 16th rounds), occurring in between rounds (e.g., after the 4th but before the 5th round). The new screen allowed participants several options: (1) administer a monetary fine of either $20 or $40, (2) administer a monetary reward of either $20 or $40, (3) send a controlling message to their partner (i.e., "You are not doing it right! You need to throw back more fish"), (4) send a positive feedback message to their partner (i.e., "We are doing well together! Let's keep up the good work."), (5) send an autonomy supportive message to their partner (i.e., "What do you think? Shall we try to maximize the sustainability of the fish population?"), or (6) take no action at all. Each action was associated with a number, and participants were required to enter the number of the action they wished to take into the field provided on screen. Afterwards, participants would move into the next round. Only the real participant would be offered the chance to take these actions, while it was explained that their 'partner' would not be able to reciprocate. This was done in order to simplify the task, maintain the experimental deception, and prevent the possibility of a cycle of retributive action and anti-social punishment from occurring (e.g., Chaudhuri, 2011; Nikiforakis, 2008). In addition, because the main focus of this study was to examine the potential

relationships between personal motivation and chosen means of trying to influence one's partner, only allowing a one-way influence allowed for greater internal validity with respect to the purpose of this experiment. If the fake partner were to reciprocate, then the question would be altered such that the experiment would be a study of how personal motivation is related to reactions to others' means of influence. As this is the first experiment to study the question of whether personal motivation is related to chosen means of influencing a partner in a social dilemma, it was prudent to examine this in a controlled, one-way manner to ensure highest internal validity, such that the knowledge generated from this experiment could then be expanded upon in a reliable manner in future studies.

Participants were still divided randomly into two groups: one group would see the sanction condition first and the no-sanction condition second [sanction-system-first (SSF) group], while the other would see the no-sanction condition first and the sanction condition second [the no-sanction-first (NSF) group] in order to examine any directional effects of the order of presentation in the main analyses.

With respect to the deception involved, a small addition was made to the script, wherein participants were told that their partner was participating in a yoked study being run by a confederate of the experimenter that had different aims and hypotheses. However, the studies had been designed so that the timing and nature of the task for both participants would be the same (that is, they'd participate together in the LGLT at the same time, and in real-time, but the data was being used by two experiments at once for different purposes). However, because of the nature of the 'other experiment' (which wasn't real), their partner would not be able to reciprocate the actions that the real participant would be able to take. This was explained as

being a product of the hypotheses of the fake confederate's experiment (though these fake hypotheses were never divulged to the real participant).

One change was also made to the LGLT. A new piece of information was added to the interface that showed the participant how many fish their partner threw back on the previous round, in order to provide them with greater indication of how their partner was behaving. This was done to (a) ensure that the sanctions that were being administered by participants in the sanction condition of the LGLT were not simply based on the participant 'guessing', and (b) design the task to be closer to real-world decentralized sanction systems, as well as those used in past research. That is, with respect to verbal communication sanctions (positive vs. negative feedback), these would reasonably be administered by one person to another because of knowledge that the person was deserving of such. That is, a person might voice their approval at seeing another act proenvironmentally (for example, praising a fishing friend for throwing back the fish they caught instead of keeping them), or give negative feedback because of seeing an improper behaviour (e.g., speaking out against another person for keeping more fish than is legal). Of course, the key operation in 'feedback' is that it is given in response to a behaviour as a means of favourable or unfavourable evaluation, and therefore, the behaviour must first be known. Moreover, past research using decentralized sanction systems typically employ paradigms wherein each participant's behaviour is known to their confederates at least in some capacity. While it can be that the specific identity is withheld in multi-*N* person paradigms, participants are still made aware of what the decisions were during the social dilemma, and are allowed to sanction the person that made that decision. Without this knowledge, sanctions administered from one participant to the other would simply be random. Thus, in the LGLT for Study 3, participants could see how much money overall that their partner was making, as well

as how many fish they returned on the previous round, and could focus on either piece of information in determining if and how they wanted to exert an influence on their partner in the sanction condition. Other than these adjustments, all other aspects of the procedure were identical to Study 2.

Measures

Motivation Toward Environmental Behaviours. Participants' motivation to perform PEBs in the context of their general lives was assessed using the same scale as was used in Study 1 and 2, namely the Motivation Toward the Environment Scale (MTES; Pelletier et al., 1998; see Pelletier, Baxter & Huta, 2011), which has been validated in previous studies (see also Villacorta et al., 2003).

Task Motivation. The quality of participants' task-specific motivation (as defined by SDT) was assessed using the same scale as was used in Study 2, namely the Task Motivation Scale, with some modifications (that is, modifications to the TMS, not to the original MTES from which the TMS was originally derived for Study 2; see Appendix H). These modifications were made in order to (a) reduce the subjective interpretability of the scale in order to help try to standardize understanding of item meanings, and (b) to increase understandability of the item with respect to wording/phrasing. With respect to the no-sanction version of the scale, item #1 was changed from "I felt driven to make sure my profit was as high as it could be" to "I felt driven to make sure my profit was high", item #6 was changed from "the money was more important to me than the fish" to "the money was quite important to me", item #8 was changed from "I was genuinely interested in seeing the population of fish stay as large as possible" to "I was genuinely interested in seeing the population of fish grow", item #10 was changed from "I

believe it is a good thing to have very little negative impact on the environment" to "I believe it is a good thing not to cause harm to the environment", and lastly item #14 was changed from "I value the health of the environment, so I wanted to act as sustainably as I could in the task" to "I value the health of the environment, so I wanted to act sustainably in the task". In addition, some modifications were made to the sanctions version of the TMS in order to account for the different sanctioning systems used between both studies (centralized in Study 2, and decentralized in Study 3). The items from Study 2 surrounding the centralized sanction system (namely, "I wanted to avoid as many punishments as possible", and "I wanted to get as many of the rewards as I could") were adapted to reflect a decentralized sanction system (i.e., "I wanted to administer a financial punishment at each opportunity", "I wanted to give a monetary reward at each opportunity") with two new items added in order to reflect the ability of participants to also send pre-written communications instead of monetary incentives (i.e., "I wanted to let my partner know I was not happy with how they were behaving at each opportunity" and "I wanted to communicate with my partner in a positive way at each opportunity"). As was done in Study 2, agglomerate indices were created for SD task motivation and NSD task motivation. Cronbach's alpha for the SD task motivation subscale for the no-sanction version was .830, and for the sanction version was .85. Initial Cronbach's alpha for the NSD task motivation subscale of the sanction version was .51; however, after removing 6 items that had low item-total correlations (items #2, 7, 10, 12, 15 and 18), this was brought up to α=.68. In order to keep the two versions of the TMS equivalent, the same items that were removed from the sanction version were subsequently also removed from the no-sanction version as well with respect to the items pertaining to the NSD task motivation subscale (namely, items #2, 9, and 15). Cronbach's alpha for the NSD task motivation subscale of the no-sanction version was .69. Means and standard

deviations for the sanction condition are presented in Table 9, while means and standard deviations for the no-sanction condition are presented in Table 10.

Goals. Participants' goals during the LGLT were assessed using the same scale as was used in Study 2, namely the Strategy Choice in the Little Gull Lake Task Scale. The same goal composites as were used in Study 1 and Study 2 were replicated. Means and standard deviations for the sanction condition are presented in Table 9, while means and standard deviations for the no-sanction condition are presented in Table 10. One item (item #3) was adjusted to read "to return as many fish to the lake as possible every round".

Inferred Goals. Participants' inferences about their partner's goal pursuit were assessed using the same scale as was used in Study 2: the Partner's Perceived Strategy Scale. Means and standard deviations are presented in Table 9 and 10 (sanction condition and no-sanction condition, respectively).

Aptitude. Participants' perception of their own understanding and mastery of the LGLT were assessed using the same scale as was used in Study 2, namely the Task Aptitude Questionnaire. The same procedure was used for calculating the index for this scale, as well. Means and standard deviations are presented in text in the Control Checks sub-section of the Results section of this study. Cronbach's alpha for this scale in Block 1 was .73, while in Block 2 is was .82.

Perceived Interest and Enjoyment. Participants' feelings of stimulation by, and engagement in the LGLT were assessed using the same scale as was used in Study 2, namely the Perceived Interest-Enjoyment Questionnaire. The same procedure was used for calculating the index for this scale, as well. Means and standard deviations are presented in text in the Control

Table 9

Descriptive Statistics and Correlations between Variables for Study 3 – Sanction Condition

Variable	*M*	*SD*	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. PEB in LGLT	158.61	*71.20*	.34*	.57**	-.36**	-.52**	-.46**	.28*	-.17	.03	-.21	.16	.35**
2. SD Task Motivation	5.16	*.92*	-	.49**	-.21	-.44**	.07	.12	>.01	-.29*	.35**	.12	-.19
3. Intrinsic Goal	4.49	*1.71*		-	-.18	-.46**	.01	.36**	-.15	.06	-.05	.26	.03
4. NSD Task Motivation	2.42	*.94*			-	.62**	.49**	-.14	.10	.02	-.04	-.11	-.04
5 Extrinsic Goals	2.30	*1.63*				-	.34**	-.11	.08	.18	-.16	-.06	-.04
6. Inference of Partner's Intrinsic Goal	3.75	*1.75*					-	-.38**	.27*	-.19	.12	-.11	-.16
7. Inference of Partner's Extrinsic Goal	2.81	*1.49*						-	-.43**	.19	-.10	.48**	.08
8. Proportion of Rewards Issued	.33	*.31*							-	-.35**	-.30*	-.38**	-.36**
9. Proportion of Fines Issued	.11	*.18*								-	-.38**	-.02	>.01
10. Proportion of Positive Feedback Messages Issued	.23	*.27*									-	-.20	-.24
11. Proportion of Autonomy-Supportive Messages Issued	.16	*.19*										-	-.11

11. Proportion of Abstains	.15	*.22*	-

Note. PEB = Proenvironmental behaviour, measured by the number of fish left in the lake at the end of the task during the testing block using the sanction condition. SD = Self-Determined. NSD = Non-Self-Determined.
**p*=<.05, ***p*=<.01

Table 10

Descriptive Statistics and Correlations between Variables for Study 3 – No-Sanction Condition

Variable	*M*	*SD*	2	3	4	5	6	7
1. PEB in LGLT	162.22	*68.87*	.41**	.60**	-.39**	-.54**	-.46**	.28*
2. SD Task Motivation	5.16	*.89*	-	.55**	-.22	-.23	-.01	.23
3. Intrinsic Goal	4.32	*1.76*		-	-.23	-.40**	-.07	.28*
4. NSD Task Motivation	2.51	*.90*			-	.68**	.41**	-.09
5. Extrinsic Goals	2.39	*1.59*				-	.34*	.02
6. Inference of Partner's Intrinsic Goal	3.51	*1.92*					-	-.38**
7. Inference of Partner's Extrinsic Goal	3.07	*1.70*						-

Note. PEB = Proenvironmental behaviour, measured by the number of fish left in the lake at the end of the task during the testing block using the sanction condition. SD = Self-Determined. NSD = Non-Self-Determined.

*p=<.05, **p=<.01

Checks sub-section of the Results section of this study. Cronbach's alpha for this scale in Block 1 was .91, while in Block 2 it was .92.

Results

Before conducting any analyses or data cleaning, the dataset were cleaned of participants for whom the experimental deception was not sufficiently believed, and thus may have had an impact on participants' behaviour in the LGLT, as revealed by structured verbal interview with all participants during the debriefing of the experimental procedure. With respect to this, 2 participants were removed from the dataset. Following this, all variables were checked and cleaned for normality, univariate outliers, and multivariate outliers according to the recommendations of Tabachnick and Fidell (2007). 1 multivariate outlier was identified using Mahalanobis distances at a significance level of .01, and was subsequently removed from the dataset.

Control Checks

Before conducting the analyses for the inference tests corresponding to the hypotheses outlined in the introduction for this study, we conducted the same control checks as were done in Study 2 in order to ensure that participants felt that they understood the task well, and were engaged by the task and not simply responding robotically or meaninglessly. The mean level of participants' responses of the Task Aptitude Questionnaire in the no-sanction condition was 5.98(SD=.70), while the mean in the sanction condition was 6.05(SD=.66), indicating that participants also felt a strong degree of understanding and mastery of the task in both conditions of the experiment. Moreover, there was no significant difference between conditions for mean participant responses on this scale using a paired-samples t-test [$t(56)=1.05$, $p=.30$]. Also, the

mean level of participants' responses on the Perceived Interest and Enjoyment Scale in the no-sanction condition was 5.19(*SD*=1.18), while the mean in the sanction condition was 5.46(*SD*=1.11), indicating that participants' also experienced a sufficient degree of engagement with, and interest in the LGLT. However, a paired-samples t-test examining difference between conditions with respect to these means showed that the participants felt more interested and engaged in the LGLT in the sanction condition compared to the no-sanction condition [$t(56)=3.12$, $p=.003$]. Nevertheless, as both means were well above the mid-point, it could be safely concluded that participants were actively engaged by the LGLT in both conditions, though there was preference for the sanction condition with respect to the level of interest that the task generated in participants.

Another control check that was performed was to make sure that the two groups (SSF vs. NSF) were not different from each other with respect to participants' general environmental motivation before beginning the experiment. In order to test for this, scores from the MTES items were used to create an index for general environmental SD motivation and general environmental NSD motivation by averaging responses on items pertaining to the intrinsic motivation, integrated regulation and identified regulation subscales for the SD motivation index, and responses on items pertaining to the introjected regulation, external regulation, and amotivation subscales for the NSD motivation index. The variables were checked for normality (no significant deviations from normality were found), and were used as dependent variables in two independent-samples t-tests. The results of the test using general environmental SD motivation as the DV showed no significant difference between groups [$t(56)=.24$, $p=.811$]. Similarly, the results of the test using general environmental NSD motivation as the DV showed

no significant difference between groups [$t(56)$=-.91, p=.365]. Thus, the SSF group and the NSF groups were equal in their general environmental motivation.

Inference Tests

Information regarding cell means for all of the inference tests can be found in Table 11.

DSS and Proenvironmental Behaviour in the LGLT

Hypothesis 1. *Hypothesis 1* predicted that participants' proenvironmental behaviour in the LGLT (measured via the number of fish left in the lake at the end of the task) would be higher in the sanction condition than the no-sanction condition. To test this, we first collapsed the data so that all participants had sanction condition and no-sanction condition data, regardless of whether they were in the sanction-system-first (SSF) group or the no-sanction-first (NSF) group, since the main objective of this article was to examine differences between the sanction and no-sanction condition (as was done in Study 2). Then, we conducted a 2(condition: sanction vs. no-sanction) x 2(group: SSF vs. NSF) mixed-factorial ANOVA with condition as the within-subjects factor and group as the between-subjects factor to allow us to examine differences across conditions while also examining if the order of presentation had an impact on any potential effect of condition on the DV. The number of fish left in the lake at the end of the task for each condition was used as the dependent variable. The results of the interaction test showed a significant interaction between condition and group [F(1,57)=25.77, p<.0005], with an effect size of η_p^2=.31; however, no main effects were found for condition [F(1,57)=.50, p=.482] or group [F(1,57)=.14, p=.709]. With respect to the simple effects for the between-subjects contrasts, the results showed no significant difference between the NSF group (M=173.69, SD=74.31) and the SSF group (M=144.03, SD=66.03) in the sanction condition (p >.05), nor a

Table 11

Cell Means for Each Group by Condition for Study 3

		Condition	
Variable	**Group**	Sanctions	No-Sanctions
Proenvironmental Behaviour in LGLT	SSF	144.03(*66.03*)	170.33(*67.33*)
	NSF	173.69(*74.31*)	153.83(*70.61*)
SD Motivation	SSF	5.29(*.79*)	5.47(*.77*)
	NSF	5.02(*1.04*)	4.84(*.91*)
NSD Motivation	SSF	2.57(*.99*)	2.60(*.96*)
	NSF	2.28(*.88*)	2.48(*1.01*)
Intrinsic Goal	SSF	4.62(*1.40*)	4.86(*1.51*)
	NSF	4.36(*2.00*)	3.75(*1.84*)
Extrinsic Goals	SSF	2.41(*1.63*)	2.41(*1.61*)
	NSF	2.18(*1.64*)	2.36(*1.60*)
Perception of Partner's Intrinsic Goal Pursuit	SSF	4.07(*1.41*)	3.59(*1.96*)
	NSF	3.43(*2.01*)	3.43(*1.91*)
Perception of Partner's Extrinsic Goal Pursuit	SSF	2.79(*1.32*)	3.35(*1.72*)
	NSF	2.82(*1.68*)	2.79(*1.66*)

Note. Information presented in reg. font represents the means, while information presented in italics in parentheses represent the standard deviations.

significant difference between the NSF group (M=153.83, SD=70.61) and the SSF group (M=170.33, SD=67.33) in the no-sanction condition. With respect to the simple effects for the within-subjects contrasts, the results showed a significant increase between the no-sanction and sanction condition for the NSF group (Mean Diff.=19.86, Std. Err.=6.88, p=.003); moreover, the results showed a significant increase between the sanction and no-sanction conditions for the SSF group (Mean Diff.=26.30, Std. Err.=6.38, p<.0005.

Because the sanction condition data came from Block 2 for the NSF group, while the no-sanction data came from Block 2 for the SSF group, and because in both cases the Block 2 condition mean was higher than the Block 1 mean, we suspected that the simple effects contrasts were actually identifying a main effect of time. So, we repeated the same mixed-factorial ANOVA, but with Time as the within-subjects factor (Block 1 vs. Block 2) by un-collapsing the data and repeating the same analysis. The results from this analysis show that this supposition was true, as the main effect of time was significant [F(1,57)=25.77, p<.0005], while the main effect of group and the interaction were both non-significant. Thus, *hypothesis 1* was not supported by the data; rather, proenvironmental behaviour in the LGLT increased from Block 1 to Block 2 as a function of the repetition of the LGLT.

DSS and Personal Motivation and Goals

Hypothesis 2a-b. *Hypothesis 2a* predicted that SD task motivation should be higher in the sanction condition compared to the no-sanction condition, while *hypothesis 2b* predicted that NSD task motivation would be higher in the no-sanction condition compared to the sanction condition. To test *hypothesis 2a*, we conducted an identical mixed-factorial ANOVA as was used in the initial test of *hypothesis 1*, with the dependent variable being participants' SD task

motivation. The results of the interaction test showed a significant interaction between condition and group [$F(1,55)=8.35$, $p=.006$] with an effect size of $\eta_p^2=.13$. No main effect was found for condition [$F(1,55)<.0005$, $p=.987$]; however, there was a main effect of group [$F(1,55)=4.05$, $p=.049$] with an effect size of $\eta_p^2=.07$, with a lower overall mean for the NSF group ($M=4.93$, $SD=.97$) compared to the SSF group ($M=5.38$, $SD=.78$). Examination of the simple effects for the between-subjects contrasts showed that there was no significant difference between the NSF group ($M=5.02$, $SD=1.04$) and the SSF group ($M=5.29$, $SD=.79$) in the sanction condition ($p=.266$); however, there was a significant difference (Mean Diff.=.63, Std. Err.=.22, $p=.006$) between the NSF group ($M=4.84$, $SD=.91$) and the SSF group ($M=5.47$, $SD=.78$) in the no-sanction condition. With respect to the simple effects for the within-subjects contrasts, the results demonstrated a significant increase (Mean Diff.=.18, Std. Err.=.09, $p=.047$) between the no-sanction and sanction conditions for the NSF group; in addition, there was a significant increase between the sanction and no-sanction conditions for the SSF group (Mean Diff.=.18, Std. Err.=.09, $p=.045$). Thus, *hypothesis 2a* was partially supported by the data, in that the mean for SD task motivation was higher in the sanction condition compared to the no-sanction condition for the NSF group when looking at within-subjects changes; however, the opposite was true for the SSF group (mean was higher in no-sanctions condition, as both groups generally increased over time). Moreover, an overall main effect of condition was not found, as order or presentation had an effect on the relationship between experimental condition and SD task motivation such that those who saw the no-sanctions condition in Block 2 had a higher overall mean than those who saw the no-sanction condition in Block 1.

To test *hypothesis 2b*, we conducted the same mixed-factorial ANOVA using NSD task motivation as the DV. The results of this analysis showed no significant interaction

[F(1,55)=1.32, p=.255], no significant main effect of condition [F(1,55)=2.46, p=.123], nor a significant main effect of group [F(1,55)=.69, p=.410]. Thus, *hypothesis 2b* was not supported by the data, and the null hypothesis was not rejected.

Hypothesis 3a-b. We expected that intrinsic goal pursuit would be higher in the sanction condition than the no-sanction condition (*hypothesis 3a*), while extrinsic goal pursuit should be higher in the no-sanction condition compared to the sanction condition (*hypothesis 3b*). For these hypotheses, similar to the methodology used in a previous experiment (see Study 2 of this thesis), we selected two representative goals to represent mutually exclusive categories of intrinsic (to return as many fish to the lake as one could each round) and extrinsic goal pursuit (to make as much money as one could each round) in order to simplify analyses by reducing the number of dependent variables. To test *hypothesis 3a*, we conducted another identical mixed-factorial ANOVA as had been used for *hypotheses 1* and *2a-b*, using participants' self-reported ratings of intrinsic goal pursuit as the DV. The results of the interaction test showed a significant interaction between condition and group [F(1,55)=7.42, p=.009] with an effect size of η_p^2=.12. Examination of the main effects showed no significant main effect of condition [F(1,55)=1.38, p=.245], or of group [F(1,55)=2.65, p=.109]. Examination of the simple effects for the between-subjects contrasts showed no significant difference between the NSF group (M=4.36, SD=2.00) and the SSF group (M=4.62, SD=1.40) in the sanction condition; however, there was a significant difference (Mean Diff.=1.11, Std. Err.=.44, p=.015) between the NSF group (M=3.75, SD=1.84) and the SSF group (M=4.86, SD=1.51) in the no-sanction condition. With respect to the simple effects for the within-subjects contrasts, the results showed a significant increase (Mean Diff.=.61, Std. Err.=.22, p=.015) between the no-sanction and sanction conditions for the NSF group. However, no significant difference was found between the sanction and no-sanction

conditions for the SSF group (p=.274). Thus, *hypothesis 3a* was partially supported by the data, in that the mean for intrinsic goal pursuit was higher in the sanction condition compared to the no-sanction condition for the NSF group when looking at within-subjects changes; however, the same was not true for the SSF group, nor was an overall main effect of condition found.

To test *hypothesis 3b*, we conducted another identical mixed-factorial ANOVA using participants' self-reported ratings of extrinsic goal pursuit as the DV. The results for the interaction test showed no significant interaction [F(1,55)=.66, p=.422], nor was there a main effect of condition [F(1,55)=.06, p=.816] or group [F(1,55)=.66, p=.422]. Thus, *hypothesis 3b* was not supported by the data, and the null hypothesis was not rejected.

DSS and Inferences of Partner's Goals

Hypothesis 4a-b. The next set of hypotheses dealt with the expected effects of experimental condition on participants' inferences about their partner's goals. Similar to participants' own personal goals, we selected two goals to represent intrinsic (they were trying to return as many fish as they could to the lake each round) and extrinsic (they were trying to make as much money as they could every round) goals that would form mutually exclusive categories. With respect to this, we hypothesized that the provision of the ability to influence one's partner in the decentralized sanction system would lead to a higher perception of one's partner pursuing an intrinsic goal in the sanction compared to the no-sanction condition (*hypothesis 4a*), while perception of one's partner pursuing an extrinsic goal would be lower in the sanction compared to the no-sanction condition (*hypothesis 4b*). To test these hypotheses, we conducted two separate mixed-factorial ANOVAs identical in methodology to the ones previously used herein, using perception of partner's intrinsic and extrinsic goal pursuit and the respective DVs. With

respect to the analysis using participants' inference of partner's intrinsic goal pursuit as the DV, the results showed no significant interaction between condition and group [$F(1,55)=2.00$, $p=.163$], no main effect of condition [$F(1,55)=2.00$, $p=.163$], and no main effect of group [$F(1,55)=.77$, $p=.385$]. Similarly, for the test using participants' inferences about their partner's extrinsic goal pursuit as the DV, the results showed no significant interaction [$F(1,55)=2.02$, $p=.161$], no main effect of condition [$F(1,55)=1.56$, $p=.218$], nor a main effect of group [$F(1,55)=.51$, $p=.477$]. Thus, *hypotheses 4a* and *4b* were not supported by the data, and in both cases the null hypothesis was not rejected.

Personal Motivation, Inference of Partners Goals and Interpersonal Influence

Hypotheses 5a-d, 6. The next set of hypotheses surrounded the relationships between quality of motivation (SD vs. NSD task motivation), inferences about partner's goals and the method(s) by which participants attempted to influence their fake partner in the sanction condition wherein the decentralized sanction system was present in the LGLT (i.e., using the collapsed sanction condition data). Recall that participants each had 4 opportunities during the sanction condition testing wherein they could (a) monetarily fine their partner, (b) monetarily reward their partner, (c) send a pre-written controlling message, (d) send a positive feedback message, (e) send an autonomy-supportive message, or (f) abstain from taking any action for or against their partner. For the monetary fines and rewards, the $20 and $40 fines/rewards were collapsed to simply indicate whether participants had issued any fine or reward. For each of the possible actions (fine, reward, controlling message, positive feedback message, autonomy support message), the total number of times that the each participant chose each of these actions was divided by the total number of opportunities they had to take any action at all in order to create a set of variables representing the proportion of times participants chose each of the

available actions. This was done to create a single meaningful variable for each available means of influence, which would convey not only the frequency of use for each method, but also this frequency in relation to the overall amount of opportunities they had available. However, we were unable to use the proportion of controlling messages as a variable of interest, and it was removed from all subsequent analyses. This was done because the data showed that, out of the 56 viable participants in the dataset, only 6 (10.71%) used a controlling message at all. Moreover, of these 6 individuals, 100% of them only used the controlling message once. This created a problematic variable, as leaving the variable as a 'continuous' variable meant having a DV that was extraordinarily leptokurtic. Moreover, the creation of groups based on raw frequency (which would essentially just be a dichotomous variable: yes or no) was far too lopsided with respect to group sizes to be viable for group comparison, with the same problem extending also to linear regressions. However, this information is interesting on its own, as it shows that very few people at all decided to use the controlling message, and those that did never used it more than once.

Moving on, in order to test this set of hypotheses, we conducted a set of partial correlation analyses. In the first set of partial correlations, the relationships between SD task motivation and the proportion of times participants used each of the different available actions (fine, reward, positive feedback message, autonomy support message, abstain) was examined while controlling for NSD task motivation, inferences about partner's intrinsic goal pursuit, and inferences about partner's extrinsic goal pursuit in order to give the unique relationships between SD task motivation and the various available methods of influence that participants had in the sanction condition. With respect to these, the results showed a significant negative relationship between SD task motivation and the proportion of monetary fines used $r_{XY_1|Z}$=-.29, p=.034. Moreover, there was a significant positive relationship between SD task motivation and

proportion of positive feedback messages used $r_{XY_2|Z}$=.34, p=.012. The relationships between SD task motivation and the proportion of rewards $r_{XY_3|Z}$=.04 , proportion of autonomy supportive messages $r_{XY_4|Z}$=.03 , and abstains $r_{XY_5|Z}$=-.18 were all non-significant (p>.05). Thus, *hypothesis 5a* and *5b* were partially supported, in that SD task motivation was positively related to the use of positive feedback messages (though, not with autonomy supportive messages), and negatively related to the use of monetary fines (but not monetary rewards).

In the second set of partial correlations, we examined the relationships between NSD task motivation and the proportion of times participants utilized the different available means of influencing one's partner while controlling for SD task motivation, inferences about partner's intrinsic goal pursuit, and inferences about partner's extrinsic goal pursuit. The results of these partial correlations showed no significant relationship between NSD task motivation and proportion of rewards ($r_{XY_1|Z}$<.01), proportion of fines ($r_{XY_2|Z}$=-.04), proportion of positive feedback messages ($r_{XY_3|Z}$=-.01), proportion of autonomy supportive messages ($r_{XY_4|Z}$=-.06), or proportion of abstains ($r_{XY_5|Z}$=-.05 ; all p's>.05), effectively demonstrating that, when controlling for SD task motivation, inferences about partner's intrinsic goal pursuit, and inferences about partner's extrinsic goal pursuit, there was no relationship between NSD task motivation and means of influencing one's partner in the sanction condition of the LGLT. Thus, *hypotheses 5c* and *5d* were not supported by the data, and the null hypothesis was not rejected in both cases.

Hypothesis 6 dealt with the relationships between participants' inferences about their partner's goal pursuit (intrinsic vs. extrinsic) and their choices with respect to the available means of influence in the sanction condition of the LGLT (i.e., using the collapsed sanction condition data). We expected that, overall, there would be a significant relationship between

participants' inferences about their partner's goal pursuit and the means by which they attempted to influence their partner during the sanction condition of the LGLT when the decentralized sanction system was present. To test this hypothesis, we conducted another pair of partial correlation analyses. In the first set of partial correlations, we looked at the relationships between the inference that one's partner was pursuing an intrinsic goal and the proportion of times participants used each of the available actions for/against their partner while controlling for SD task motivation, NSD task motivation and inferences that one's partner was pursuing an extrinsic goal. The results showed no significant relationship between inference about partner's intrinsic goal pursuit and proportion of rewards ($r_{XY_1|Z}$=.10), proportion of fines ($r_{XY_2|Z}$=-.10), proportion of positive feedback messages ($r_{XY_3|Z}$=.04), proportion of autonomy supportive messages ($r_{XY_4|Z}$=.13), or proportion of abstains ($r_{XY_5|Z}$=-.12 ; all *p*'s>.05), effectively demonstrating that, when controlling for personal task-specific motivation (SD and NSD) and inferences about partner's extrinsic goal pursuit, there was no relationship between inferences about partner's intrinsic goal pursuit and the means by which participants attempted to influence their fake partner in the sanction condition of the LGLT.

The next set of partial correlations dealt with the relationships between the inference that one's partner was pursuing an extrinsic goal and the proportion of times participants chose each of the possible means of influencing their partner during the sanction condition of the LGLT, while controlling for personal task-specific motivation (SD and NSD) and inferences about partner's intrinsic goal pursuit. The results of this set of partial correlations showed a significant negative relationship between the inference that one's partner was pursuing an extrinsic goal and the proportion of monetary rewards issued $r_{XY_1|Z}$=-.36, *p*=.008. Moreover, there was a significant positive relationship between extrinsic goal inference and proportion of autonomy-supportive

messages issued $r_{XY_2|Z}$=.49, p<.0005. The relationships between extrinsic goal inference and the proportion of fines issued ($r_{XY_3|Z}$=.18), the proportion of positive feedback messages given ($r_{XY_4|Z}$=-.13) and the proportion of abstains ($r_{XY_5|Z}$=-.01) were all non-significant (all p's >.05). Thus, *hypothesis 6* was supported by the data, in that participants' inference that their partner was pursuing an extrinsic goal was significantly related to the proportions of times they used monetary rewards and autonomy-supportive messages, even when controlling for personal task-specific motivation (SD and NSD) and inferences about one's partner's intrinsic goal pursuit.

Discussion

This study sought to provide understanding of the relationships between personal task motivation (SD and NSD) and goals (intrinsic and extrinsic), inferred goals, and proenvironmental behaviour when a decentralized sanction system is used as an intervention to try to increase cooperation in a resource dilemma. In addition, we sought to use the nature of the decentralized sanction system (i.e., a system in which participants have fixed means of attempting to influence the behaviour of a partner surrounding a finite natural resource) as an opportunity to explore whether personal task motivation and goals, as well as inferences about one's partner's goals, are related to the way(s) in which participants attempt to exert influence over another person in a resource dilemma. These aims had both fundamental and practical application, as they would provide a greater knowledge base to SDT regarding the ways in which personal motivation and goals transfer into interpersonal behaviours in a dyadic relationship not yet explored in past research, as well as advance understanding of the nature of the intraindividual effects of decentralized sanction systems in resource dilemmas as means of intervention to increase sustainable behaviour surrounding natural resources.

Overall, the DSS employed in this study, because of its one-way nature (i.e., not a two-way interaction), was not overly powerful in changing participant behaviour, NSD motivation and extrinsic goals, or inferences of the fake partner's goals. However, the presence of the DSS did somewhat increase SD task motivation and intrinsic goal pursuit. Seeing sanctions first (i.e., in Block 1) generally set a higher level of SD task motivation and intrinsic goal pursuit; and, the addition of the sanctions in Block 2 for the NSF group led to an increase in these variables above and beyond the general effect of time that was otherwise seen in the SSF group. With respect to the relationships between motivation, inferences of partner's goals and means of influence used in the DSS, the results of controlled partial correlations demonstrated that participants' personal SD task motivation and inference that their partner was pursuing an extrinsic goal were both significant predictors of four out of five of the statistically available means of influence: namely, reduced use of monetary punishments and increased use of positive feedback (SD task motivation), and reduced use of monetary rewards and increased use of autonomy-supportive messages (inference of partner's extrinsic goal pursuit). In general, the overall findings of Study 3 indicate that the ability of participants to influence and communicate with their partner can increase SD motivation and intrinsic goal pursuit, which also leads to more altruistic means of influence being used. This finding points to the importance of individual motivational quality in helping to preventing some of the known problems that can be associated with decentralized sanctions systems when retributive and antisocial punishment occurs.

Part of the analyses involved in this study were replications of the analyses done in Study 2 of the main studies of this thesis in order to identify if a decentralized sanction system would have differential effects. With respect to this, the results showed that the decentralized sanction system did, indeed, have a different impact than the centralized sanction system. Whereas the

centralized sanction system in Study 2 had a significant and, with respect to effect size, substantially large effect on behaviour, as well as an effect on NSD task motivation, extrinsic goal pursuit, and the perception of the fake partner's goals (despite the fact that the behaviour of the fake partner did not change across conditions), the decentralized sanction system showed a different trend. Regarding proenvironmental behaviour in the LGLT, the decentralized sanction system did not appear to exert any effect on behaviour; rather, participants increased in their proenvironmental behaviour as a function of the repetition of the task, possibly inferring that people have a natural tendency to become more proenvironmental as they utilize a natural resource repeatedly over time. Similarly, the addition/removal of a decentralized sanction system into the LGLT had no impact on NSD task motivation or participants' extrinsic goal pursuit. However, the decentralized sanction system did exert an influence on SD task motivation and intrinsic goal pursuit in almost an identical way between the two, such that, in the no-sanction condition, those that saw this condition in Block 2 of testing (i.e., SSF group) showed greater levels of SD task motivation and intrinsic goal pursuit than those who saw the no-sanction condition in Block 1 (i.e., NSF group). While SD task motivation and intrinsic goal pursuit generally increased over time for both groups, the effect was more pronounced with this particular order of presentation, indicating that the affordance of the ability of participants to interact with and attempt to influence their partner in Block 1 lead to greater internalized motivation and the pursuit of an intrinsic goal when that affordance was no longer available, compared to when such affordances were available after having already conducted one session in the resource dilemma with one's partner. While part of this was expected in the theory- and data-driven hypotheses of this study, the effect of the order of presentation was a novel and interesting finding.

In addition, and similar to the findings regarding NSD task motivation and extrinsic goal pursuit, the addition/removal of a decentralized sanction system had virtually no effect on participants' inferences of their partner's goal pursuit, which was quite contrary to previous findings regarding the effect of a centralized sanction system on such. Taken together, it would seem from the results of this study that the effect of the decentralized sanction system, overall, was relatively benign.

These findings are, however, not necessarily surprising. In a normal decentralized sanction system, participants not only are afforded the ability to give monetary fines and/or rewards to fellow participants in the dilemma, but also will receive such from their confederates. As such, there is the allowance of the overall system to exert an effect on each individual participant through the knowledge that they, themselves, could be reciprocally fined/rewarded by their teammates. However, in the present study, the main purpose of the research was to provide foundational evidence that participants' own motivational quality and goal pursuit is significantly related to how they attempt to influence others. As such, we used a fake partner in order to gain greater internal validity; however, in order to do so, it was a necessary decision to forego the ability of the fake participant to try to reciprocate influence back to the participant, as this would have made the programming for the fake partner greatly more complicated, would have changed the experimental question being investigated, and possibly ran the potential of creating anti-social positive feedback loops (unless the fake participant was constrained to only exert a certain type of influence, which could have had the effect of creating normative behaviour for the participant), such as has been found in previous research (see Chapter 1: General Introduction). Thus, without the ability of the decentralized sanction system employed in this study to exert an influence back on the participant, it is not necessarily surprising that

participants' own behaviour was not affected by its addition or removal. This was an unfortunate limitation of the current study, one that increased overall experimental control and allowed us to experimentally isolate the one-way relationship between participants motivation, inferences about partner's goals, and the means by which they attempted to influence their partner without running into the same problems that have been encountered in previous experiments; however, it may have come at the cost of eclipsing the ability of the decentralized sanction system to reciprocally exert an influence back on the participant.

Still, even without the provision of the fake participant to attempt to influence the real participant, it was reasonable to hypothesize that the affordance of the ability to influence the fake partner could still have exerted an effect on behaviour and motivation. If participants were using their means of influence to establish norms within the dilemma, it would be feasible that they may change their own behaviour to be better in line with these norms, or to better exemplify them. Moreover, the affordance of the ability to influence one's partner was also hypothesized to potentially affect personal motivation by allowing for greater choice, thus potentially increasing autonomy and consequent internalized motivation. The latter, in fact, turned out to be somewhat supported by the data with respect to SD task motivation and intrinsic goal pursuit.

Ultimately, what these results may add to the overall literature on decentralized sanction systems is that it is possible that the effect seen in past studies of decentralized sanction systems on increased cooperation in social dilemmas has to do with participants' knowledge that they can be rewarded and/or penalized by their confederates, and not by the affordance of participants to be able to exert this influence on their partners. If the latter was true, then we should have seen a main effect of condition on proenvironmental behaviour in the LGLT. In this way, even despite the shortcomings of the sanction system used in this study, we are still able to proffer some

potential insight into the nature of the effect of such systems on behaviour that could only have been discovered by isolating one direction of a two-way interaction.

With respect to the other experimental hypotheses that were tested, which were ultimately the main focus of this study, the experiment was largely successful. When examining whether personal task-specific motivational quality (SD motivation vs. NSD motivation) is related to the means by which participants attempted to influence their partner, the results showed that the stronger participants' SD task motivation was, the more positive feedback messages they sent to their confederate. Moreover, stronger internalized motivation was also related to a decreased use of monetary fines in order to try to influence one's partner. On the other hand, NSD task motivation was not related to any of the means of influence available in this study when controlling for SD task motivation and inferences about the fake partner's goals. One interesting abnormality surrounded participants' use of the controlling message, "You are not doing it right! You need to throw back more fish." Regarding this, only 6 participants in total utilized this means of influence at all; moreover, of these 6, none of them used it more than once. Thus, it appears that, regardless of personal motivation, participants felt reluctant to use such a message in order to try to encourage their partner to act more proenvironmentally in the task. Another interesting aspect of these analyses was that the significant results regarding personal task-specific motivation were found even when controlling for inferences about the fake partner's goal pursuit. This suggests that the relationships between personal SD task motivation and chosen means of attempting to influence one's partner in a decentralized sanction system in a resource dilemma exist above and beyond any interpersonal inferences that may be occurring, potentially demonstrating the unique contribution of examining intraindividual factors when

attempting to understand interpersonal behaviours surrounding cooperation over a finite natural resource.

Lastly, we also explored the relationships between participants' inferences about their partner's goal pursuit and the means with which they attempted to influence their partner. With respect to this, it was found that participants' inference that their partner was pursuing an intrinsic goal was not significantly related to any of the available means of influence involved in this study when controlling for the inference that the fake partner was pursuing an extrinsic goal. On the other hand, it was found that the more that participants perceived that their partner was pursuing an extrinsic goal (when controlling for the perception of the partner pursuing an intrinsic goal), the more likely they were to use autonomy-supportive messages in order to sway their partner away from extrinsic goal pursuit, and the less likely they were to issue monetary rewards to their partner. In other words, in general, if a participant believed that their partner was 'in it for the money' so to speak, the less likely they would 'play into this' by giving monetary rewards. Instead, they would be more likely to issue a message saying, "What do you think? Shall we try to maximize the sustainability of the fish population?" This is interesting given that, conceivably, if a person thinks that another is degrading the health of a resource because they are only concerned about money, they may try to use this incentivized motivation to increase proenvironmental behaviour by administering monetary fines. In other words, if one thinks that their confederate is hurting a resource because they only want personal profit, it might be reasonable to hurt their personal profit in order to get them to act more appropriately toward the health of the natural resource. Instead, participants on average were more likely to respect their partner's autonomy, and to use this respect as a dominant means of influencing them to act more proenvironmentally in the LGLT. This suggests that participants were relatively naturally

inclined to try to move their partner to become more intrinsically motivated when they perceived that their partner was pursuing an extrinsic goal.

Altogether, the results of Study 3 provide controlled information about the relationships between personal motivation and the means by which participants will attempt to influence their partners in an iterated resource dilemma. This evidence can then be used to examine more complex questions in a more interactive format. As such, it is our hope that the findings presented herein not only advance current knowledge of such relationships, but also spawn new research that examines these in more detailed and complex paradigms. In so doing, there is greater potential to create interventions that utilize decentralized sanctions in order to increase cooperation over dwindling natural resources that are degraded by human activity in such ways as to avoid the potential negative pitfalls that can occur in such systems.

Chapter 3

General Discussion

The overarching aim of the research presented in this thesis was to ultimately establish the importance of considering intraindividual factors, namely motivation and goals as defined by SDT, when attempting to understand the factors that promote or inhibit cooperative, sustainable behaviour in managing natural resources. Environmental problems in the contemporary world are serious issues that continue to become more serious as time goes on. The source of many of these issues is human activity, and the population of humans engaging in these activities rises over time, exacerbating these already serious problems. As such, there is an ever-increasing amount of people attempting to harvest natural resources, putting greater importance on understanding how this can be done in a sustainable fashion so as not to lead to the collapse of the resource and any ecosystem(s) that are associated with it.

The study of resource dilemmas provides an excellent avenue for examining these issues, as it provides a means by which controlled laboratory experiments can be conducted using paradigms that exemplify real-world environmental problems. In the case of the research presented herein, the focus was on recreational fishing and how this resource can be managed sustainably, as research has shown the detrimental impact with respect to biodiversity loss and ecosystem collapse that mismanagement of this resource can have.

The present research uncovered the significant predictive utility of self-determined motivation and intrinsic goal pursuit with respect to increased proenvironmental behaviour in a resource dilemma surrounding recreational fishing. In Study 1, a pathway model was supported by the data in which having greater self-determined general environmental motivation lead to greater intrinsic goal pursuit, and this, in turn, lead to greater levels of proenvironmental behaviour in the resource dilemma, as evidenced by the number of fish left in the lake at the end of the task. In addition, higher strength of SD motivation also predicted lesser strength in both

extrinsic goal and reactive goal content, subsequently increasing PEB in the LGLT as well. A subsequent re-test of this pathway model in Study 2 corroborated these findings using task-specific motivational quality, with the exception of the indirect effect of SD task motivation on PEB in the LGLT through reactive goals (which was not significant in Study 2), thereby generally supporting the reliability and stability of this model. This exemplifies the importance of fostering internalized motivation when trying to encourage cooperation between people over a finite natural resource, as it will both increase specific intrinsic goal content, and decrease extrinsic goal content, and through these effects increase cooperation over a finite resource above and beyond just sustainability, but actually improving the health of the resource. Where nearly all of the extant literature in this area has examined important interpersonal factors that lead to more or less cooperation in a social dilemma in general, the present research points out that intraindividual motivation can explain a large portion of cooperative behaviour, and that the present dearth in the literature may represent a fundamental gap that could hinder the effectiveness of future interventions surrounding natural resource management.

Expanding on this in Study 2, we provided evidence of the influence that a centralized sanction system can exert on participants' behaviour, motivation, goals, and perception of others' goals in a resource dilemma. The presence of a centralized sanction system can have a positive effect on the mean level of proenvironmental behaviour of a given group of people, quite noticeably increasing the amount of the resource that they leave for others, for their future selves, and for the continued health of the resource itself. Moreover, the presence of such a system does not necessarily negatively impact internalized motivation, as the source of this motivation exists inside the individual, and appears resilient against outside influence. However, the positive effect of a centralized sanction system does not extend beyond the presence of that system, such

that if the system is removed, proenvironmental behaviour will decrease. Moreover, the presence of a centralized system will increase non-self-determined task motivation, the same being true for extrinsic goal pursuit as well. In addition, the presence of a centralized sanction system can lead to 'distrust' amongst participants of a resource dilemma, such that, when the system is no longer there, it increases the belief that others are motivated by external incentives, and not by the intrinsic enjoyment of encouraging the health of the resource itself. In sum, it would seem from the results of this research that a centralized sanction system can provide a point-source intervention to increase proenvironmental behaviour surrounding a finite natural resource; however, the longer term effects of relying on such an intervention may not be desirable over time. In other words, the centralized sanction system may have improved behaviour 'in the moment', so to speak, but did not necessarily encourage an overall more ecological citizen, which should be the ultimate goal of environmental psychology if it seeks to create lasting change.

This can have practical as well as theoretical implications. Naturally, the idea behind research using sanctioning systems to increase cooperation in social dilemmas is to create a knowledge base from which interventions can be derived. The findings from this study lend to a body of research that can testify to the point-moment ability of a centralized system of incentives to increase cooperation in a resource dilemma, at the costs outlined above. In a practical sense, it means that centralized sanctions may be a relatively viable short-term solution to resources that are threatened by human activity, though with some intraindividual and interpersonal costs associated with them. From a theoretical standpoint, specifically relating to SDT, the findings surrounding the CSS and its effect on proenvironmental behaviour in an interpersonal context suggest that, at least in this context, external incentives don't necessarily hurt behaviour, at least

not in a relatively short time span. While the presence of the sanctions did shift the strength of NSD task motivation, this did not have a deleterious impact on proenvironmental behaviours in the dilemma. Within SDT, the traditional conceptualization of SD and NSD motivational subtypes is that the latter is subtractive of the former, which is apparent in the very means by which a single index of motivation is traditionally calculated in SDT, which is to weight the individual motivational subtypes and subtract the NSD subtypes from the SD ones; however, the timeline by which this may occur is not necessarily specified directly, and furthermore, a growing body of research, including the findings from Study 2 of this thesis, suggest that having mixed-motivations – that is, having a profile of motivation that includes equal strengths of SD and NSD motivational subtypes – may not necessarily be a negative motivational state that is derogatory of behaviour and well-being. In education and sports, for example, having mixed-motivations can be useful with regards to some outcomes (Boiché, Sarrazin, Grouzet, Pelletier & Chanal, 2008; Ratelle, Guay, Vallerand, Larose & Senecal, 2007). In the new context of resource dilemmas, it may also be true that adding monetary rewards to proenvironmental behaviour does not necessarily shift motivational quality to be dominantly extrinsic; rather, it may simply add another dimension to an otherwise healthy motivational profile. Nevertheless, despite all of this, it is apparent from the pathway analyses from Study 1 and Study 2 that, at its root, the main ingredient, so to speak, in a sustainable individual's motivation is SD motivation. Thus, regardless of any effect of incentives, positive or negative, on behaviour, focus should never be lost on the fact that SD motivation should be cultivated in individuals in all cases.

But the research presented herein also examined whether the same variables (motivation, goals, inferences of others' goals) are related to how people may attempt to exert an influence over each other, in addition to how such will react when influence is exerted upon the

participants themselves (i.e., when centralized sanctions are present). To do this, we examined the relationships between personal motivation, partner's perceived goals, and the means by which participants will attempt to influence their partners in a resource dilemma given the affordance to do so in a variety of ways, including monetary incentives (rewards or fines), issuing controlling messages designed to tell the other person what to do, providing positive feedback to encourage the sustenance of desirable behaviour, and giving an autonomy-supportive suggestion to try to act sustainably toward the health of the natural resource. With respect to this, it was found that SD motivation is related to the use of healthier means of influencing other people, namely providing positive feedback, while also reducing the reliance on external incentives (i.e., monetary fines) in order to try to control others' behaviour. Moreover, this relationship exists independent of interpersonal constructs, such as the inferences that one makes about the goals their partner is attempting to pursue, which also have their own unique relationships with the ways in which a person will try to influence another in a decentralized sanction system in a resource dilemma (i.e., less reliance on monetary rewards, and greater frequency of use of autonomy-supportive communication). In this way, the problem of anti-social and retributive punishment seen in previous studies wherein participants can punish their confederates can be potentially abated by cultivating greater individual, internalized motivation toward the activity, as the present research has shown this can decrease reliance on monetary fines as a means of interpersonal influence. In sum, the results surrounding the analyses for both the intraindividual and the interpersonal constructs in this area demonstrate that neither should be ignored, and that both will have valuable contributions to understanding behaviour.

As there were replicable findings between Study 1 and Study 2 with respect to the mediation analyses in both studies, there were also some replicated findings between Study 2 and

Study 3. In both the sanctions and no-sanctions conditions, PEB in the LGLT had the same significant correlations with SD task motivation (positive), intrinsic goals (positive), extrinsic goals (negative), inferences about partner's intrinsic goals (negative) and inferences about partner's extrinsic goals (positive) for both Study 2 and Study 3. In addition to these replicated relationships across both studies, there were also corroborated relationships (in both sanction and no-sanction conditions alike) between intrinsic and extrinsic goals pursuit (negative), intrinsic goal pursuit and inferences about partner's extrinsic goals (positive), extrinsic goals pursuit and inferences about partner's intrinsic goals (positive), and inferences about partner's intrinsic goals and inferences about partner's extrinsic goals (negative). That is, in both conditions across both studies, higher intrinsic goal pursuit was related to lower extrinsic goal pursuit and higher inferences that one's partner was pursuing an extrinsic goal; similarly, higher extrinsic goals pursuit was related to higher inferences that one's partner was pursuing an intrinsic goal. Therefore, in both studies, it was found that participants who were pursuing an intrinsic goal generally inferred more strongly that their partner was pursuing an extrinsic goal, and vice versa. Moreover, in both studies, the inference that one's partner was pursuing an intrinsic goal was not compatible with the inference that one's partner was pursuing an extrinsic goal (an increase in one meant a reduction in the other). Thus, in both Study 2 and Study 3, across both conditions, a similar constellation of bivariate correlations was found between all of these variables.

When taken together, the present research suggests that intraindividual motivation and goals are important factors to consider in future research when trying to better understand (a) how proenvironmentally a person will act in a resource dilemma, (b) how they will be affected by the administration of a centralized sanction system, and (c) how they will attempt to influence others in a decentralized sanction system. Overall, it was the hope of this research program that

the provision of this fundamental knowledge, which has not been explored in the extant literature before, will lead to new and interesting research questions that no longer ignore the importance of intraindividual factors when trying to predict cooperative behaviour or the interpersonal means by which people try to induce/encourage cooperative behaviour in others. By doing so, it is hoped that, in turn, this research and the potential research it can help engender will better hone any interventions that seek to utilize centralized or decentralized sanctions in order to increase cooperative, sustainable, proenvironmental behaviour surrounding finite natural resources. Through this, perhaps the mounting environmental issues facing contemporary societies around the globe can not only be abated, but eventually reversed.

Limitations of the Present Research

The research contained in this thesis is not without its limitations. A main limitation that runs through all three of the main experiments in this thesis is the nature of the resource dilemma employed as the experimental task in all studies. The LGLT used a 2-person stranger design, meaning that it used only two participants, who were, essentially, strangers to each other before the onset of the experiment (although one of them technically did not exist, the true participant did not know this). While this helps to create a stronger base of internal validity by reducing the normative influence that an *N*-person design may have on the participant, it nevertheless somewhat lessens the external validity of the task, and therefore its generalizability. That is, resource dilemmas in the real world tend to involve many individuals, with the number of confederates sometimes known to the person, and sometimes not. Thus, a certain degree of caution must be applied to over-generalizing the findings of the studies contained herein, relative to the actual design of the resource dilemma that was employed.

A limitation of the second study – in which a CSS was added/removed to the LGLT and the effects of both condition and order of presentation were examined on several DVs – was the lack of a baseline with which to compare the effects of the CSS. Because of the foundational nature of the research in this thesis, it was desired to employ a number of DVs relevant to the scope of the theory used to guide hypothesis development. As such, the required cognitive load on each participant went up, as the total time to complete the experiment was between 55-75 minutes for each participant, lending to the possibility of cognitive fatigue. While it was nevertheless still feasible to have two groups, such that each group could examine one direction of presentation, this methodology occluded the ability to establish baseline behaviour. Without this, it can't be concluded that the removal of the CSS in Study 2 returned behaviour to baseline, or that it may have actually sunk below such. It is true that the means for all three studies for the no-sanction conditions were all relatively close. In Study 1, the mean number of fish left in the lake was 146.77; in Study 2 the mean for the no-sanction condition was 136.12; however, in Study 3, the mean for the no-sanction condition was 162.22. This can be somewhat indicative of an overall baseline for the population being studied. Moreover, in Study 2, the means for the no-sanction condition for each group was nearly identical. For the SSF group, the mean number of fish left in the lake at the end of the task was 136.50, while for the NSF group it was 135.63. Again, this can be indicative of baseline behaviour, but it is not definitively such.

Another limitation within the present research surrounded the nature of the DSS used in Study 3. As outlined in the Discussion section of Study 3, the DSS used in Study 3 was not a 2-way interaction between participants; rather, it was constrained for the purposes of experimental control to be a 1-way influence, as the foundational nature of the research necessitated a greater source of internal validity. This most likely prevented the DSS from having an effect on

participants' proenvironmental behaviour within the sanction condition, as evidenced by the null results of the repeated measures ANOVA examining differences between the sanction and no-sanction conditions in Study 3. Past research has shown that the use of a DSS is a significant positive predictor of increased cooperation in a social dilemma. Thus, despite the fact that the present research did not find an effect of the DSS in Study 3 of this thesis, this finding should not necessarily be generalized towards the greater body of work regarding the use of DSSs in social dilemmas. Rather, this is instead a limitation of the present research, one that afforded a more purified examination of the relationship between personal motivation and means of interpersonal influence in a resource dilemma, but at the expense of generalizability in certain areas of the findings (though, there was also a positive aspect to this limitation with respect to research using DSSs in social dilemmas, as discussed in the Discussion of Study 3 in Chapter 2 of this thesis, regarding the possible differential impact of being able to influence others compared to the knowledge that one can be incentivized by others involved in the dilemma).

Another limitation of Study 3 was that the controlling message that was employed as one of the possible means of influence available to participants simply did not function properly. That is, only a small subset of participants chose to use this means of influence, and of those that did, they only ever used it once. It is probable that the wording of this particular pre-written message was simply too strong for the comfort of participants to use. As previously mentioned, the task employed a 2-person stranger design. It is probable that participants did not feel that the language involved in this message was socially appropriate to send to a stranger (or, quite simply, not appropriate at all). This, unfortunately, led to the elimination of this means of influence from the data analyses conducted in the inference testing for Study 3. As such, there was, essentially, a small hole in the findings that should otherwise have been available from

Study 3: namely, the relationship between NSD motivation and the use of controlling messages in a resource dilemma, which was of interest to the researchers in the designing of the methodology and measures used in Study 3.

Nevertheless, despite these shortcomings, the nature of the research examined in this thesis was considered quite successful. Overall, the experimental task and methodology surrounding it functioned properly across three studies. Moreover, the knowledge generated by the research herein was controlled in an experimental fashion to a high degree, lending a strong foundation for future research from which to be able to jump forward into new questions.

Future Directions

There are a myriad of future directions from which the knowledge generated by the present research can be taken by future research. With respect to SDT, the findings from the studies herein can be taken as evidence that this theory can be applied to a new domain of interpersonal behaviours. While the present studies focused on resource dilemmas, another area of viable exploration would be to examine the same relationships in the context of public goods dilemmas. In a resource dilemma participants must choose between how much of the resource to *harvest* for themselves and how much to leave for others, for the future, and for the health of the resource; however, in a public goods dilemma participants must decide how much to *contribute* toward a common resource. While both fall under the umbrella of social dilemmas, it would be of interest to future research in applying SDT to interpersonal behaviours to also examine this other side of social dilemmas, of contributing compared to harvesting. Such research would also have somewhat different implications toward environmental psychology, such as the application of the knowledge generated thereof toward behaviours such as cleaning of public parks, replanting of forested areas, individual contributions to collective pollutions such as air pollution

from personal automobiles, etc., compared to harvesting behaviours relevant to more traditional resource dilemmas, such as recreational fishing, use of potable water and arable land, commercial harvesting of wild species, and foresting.

Future research could also examine the same relationships investigated in the present research using more expanded resource dilemma parameters. For example, future research could employ larger *N*-person designs that could include (a) larger numbers of constrained fake participants in order to examine the different impacts of groups of apparently extrinsically oriented individuals compared to groups of fake participants constrained to act more proenvironmental than simple sustainability would require, as well as (b) different sized groups of real participants in order to examine more realistic interactions between participants surrounding a finite natural resource while also examining the overall motivational profile of each group and investigating the predictive ability of such on each group's overall performance in the dilemma. In addition, future research examining motivation could also examine its interaction with other intraindividual factors that have been shown to have an effect in resource dilemmas, namely nature relatedness. Both constructs have a common thread of dealing with the relationship between nature and personal identity, and an interesting avenue of investigation could be to examine how both constructs may be related in promoting more sustainable behaviour around finite natural resources. For example, past research on nature relatedness has demonstrated that showing photographic representations of nature to participants prior to conducting a resource dilemma will increase nature relatedness, and increase cooperative sustainability in the dilemma. Does this same paradigm have an effect on SD motivation as well? Do the two constructs increase separately, or is there a summative or interactive relationship between them with respect to the effect of nature exposure on proenvironmental

behaviour in a resource dilemma? These questions could open up new applications, as well as further interesting lines of questioning in future research.

Another avenue of future exploration in the realm of SDT and interpersonal cooperation over finite natural resources would be to examine the full role of amotivation in the non-cooperation of individuals over such resources. In the present studies, the items pertaining to amotivation from both the MTES and the TMS both deal with a slightly truncated version of environmental amotivation, which has been shown to have 4 main factors: strategy beliefs, capacity beliefs, effort beliefs and helplessness beliefs (Pelletier, Dion, Tuson & Green-Demers, 1999). In the MTES, it is mostly the helplessness beliefs that are targeted by the items, and in the TMS (which only has three amotivation items compared to four in the MTES), this is even truer. However, the investigation of what promotes amotivation, specifically, toward proenvironmental behaviour in a resource dilemma is an important question that could be addressed in future studies in interesting ways. For example, what facets of the dilemma itself promote greater amotivation? If less information about the health of the resource is present, does this increase poor strategy and helplessness beliefs in participants? If information about the hardships associated with environmental cleaning programs at the individual level is presented before the dilemma occurs, does this increase poor capacity and effort beliefs? The specific role of amotivation in predicting poor resource management could be a valuable source of information in future studies, as it would greater illuminate the reasons why people *don't* properly cooperate over finite resources.

Outside of SDT, future research on resource dilemmas as a whole could have a greater focus on other intraindividual constructs that, as of yet, have largely been ignored in preference of interpersonal ones. One such construct of interest should be environmental concern, which,

essentially, breaks down into three categories of egoistic, altruistic and biospheric concern (Schultz, 2001). Egoistic concern, in essence, is defined as being concerned about environmental pollution and degradation because the person knows that such will eventually circle back to affect them personally with respect to their own health and well-being. Thus, this type of concern, most common in Western cultures, predicts that a person will try to avoid polluting the environment because they don't want the negative effects of such to affect them personally. Altruistic concern is defined as being concerned about environmental pollution and degradation because of the effect that it may have on other members of one's community, or culture at large. This is typically found in greater strength in Eastern, collectivistic cultures. This type of concern essentially predicts that a person will try to avoid polluting the environment because they do not want to negatively affect those around them. Lastly, biospheric concern can be defined as being concerned about environmental pollution and destruction because of the implications that such will have on the surrounding biosphere (i.e., on ecosystems). This type of concern will predict that individuals will try not to harm the natural environment for the sake of protecting the wild inhabitants of relevant ecosystems. These three types of concern draw strong parallels to the language used to describe the outcomes of acting unsustainably towards finite natural resources in a resource dilemma. For example, within this thesis, the potential outcomes of behaviour in a resource dilemma are often described as personal gains at a loss of future selves, of others involved in the dilemma, and the detriment of the resource itself. Thus, it is reasonable to expect that future investigations should find a relationship between the type of concern a person has and the outcome of behaviour that will be focused on within the dilemma, and how such relationships may predict the degree to which a person acts sustainably or unsustainably in a resource dilemma. This is simply one example of a family of intraindividual constructs known to

environmental psychology that have been investigated with respect to individual behaviours, but could be expanded into interpersonal, cooperative behaviours surrounding natural resource use.

Another viable avenue of future investigation could be to examine the impact of different types of resources on intraindividual factors such as motivation, relatedness and concern. In the present research, the focus was on fish populations of a hypothetical, virtual lake, a fictitious resource that nevertheless implied that the outcome of participants' behaviour would have an impact on living organisms (i.e., how many fish die, and how many fish live on, though, of course, the fish weren't real; rather, this would be inferred in the hypothetical scenario employed in the LGLT). It would be interesting to understand if motivation and consequent behaviour change when the resource changes. For example, are people generally as intrinsically motivated toward protecting non-living resources as they are towards sentient, living ones? Will the same strength of relationships between SD motivation, intrinsic goals, and proenvironmental behaviour exist when the resource in question is trees compared to sentient species that are traditional resources of human consumption? Moreover, do these relationships hold true when examining living systems such as forests compared to simple physical resources such as arable land use, or potable water? Since the sphere of human activity extends to having a detrimental effect on all of these areas, and since the present research has set the stage, so to speak, that personal motivation and goals can have significant predictive utility with respect to proenvironmental behaviour surrounding finite natural resources, it would be of practical utility to further examine these relationships with respect to other natural resources that can also have disastrous consequences when mismanaged and over-exploited.

With respect to the use of sanctioning systems in resource dilemmas, the findings from the present research may also point to some interesting new questions and avenues of

investigation. For example, while the findings from the present studies included herein allude to potential longer-term negative effects of the use of centralized sanctioning systems in inducing increase cooperation in a resource dilemma, it would be interesting to see actual longitudinal path analyses conducted on the effect of a CSS on PEB in an RD. This could be done in a relatively simple manner by extending the general methodology of Study 2 with some modifications. That is, participants could be split into two groups, a sanctions and no-sanctions group, who are invited into a laboratory session to complete a resource dilemma (e.g., the LGLT), subsequently completing any other DVs of interest (such as well-being or motivation indices). Participants could then be invited to return to the lab each day for a week, or once a week for a three to four week period in order to see how differences between the sanction and no-sanction condition change over an extended period of time.

In addition, the present research uncovered both positive and negative effects of the use of centralized sanctions in a resource dilemma. In truth, some environmental problems have already become quite serious, and while the viability of centralized sanctions as a long-term solution may be questionable given the findings from multiple studies both discussed and presented herein, the use of such systems may be necessary in a short-term scenario in order to stop dangerous processes such as desertification and species loss from heavy deforestation. That is, the use of centralized sanctions can stop the bleeding, but does not necessarily heal the wound; however, sometimes the former is the most pressing concern, and must be addressed before any further intervention can be made. With respect to this, it would be of interest to environmental psychology to investigate how some of the negative, potentially longer-term effects of the use of a CSS in an RD can be mitigated. For example, could educational interventions shown to participants before conducting the RD on the importance of curbing

dangerous environmental destruction help to provide a rationale to participants regarding the use of the CSS in the RD, and thus reduce some of the extrinsic focus that the CSS seems to induce in people when used? Could intermittent communication provided to participants during the course of the RD that discusses, for example, governmental interest in the health and well-being of the environment help to increase the perception that the centralized sanction system is in place for the common good and the health of the resource, and thereby reduce the negative impact of a centralized sanction system, in addition to potentially putting more focus on the intrinsic health of the resource, rather than on extrinsic rewards and punishments? Moreover, another important avenue could be to investigate if the short-term positive effects of a CSS can be transferred to other behaviours. It may also be interesting to examine the impact of a CSS on other dependent variables, such as environmental awareness, environmental concern, environmental values and attitudes, and quality of life (i.e., well-being). The present research demonstrates that it is important to understand the potential negative effects and practical limitations to the use of certain interventions in trying to increase cooperative, sustainable behaviour in a resource dilemma; but an important compliment to these findings in the future is addressing the question of how such effects and limitations may be overcome, if possible.

In sum, it is hoped that the findings from the present research lend significant weight to the supposition that intraindividual factors are of large importance for scientific investigation, not just for individual behaviours, but for interpersonal ones as well. Following this, it is hoped that future research can continue to explore the relationships evidenced in the present research in new and interesting contexts, and in comparison with other intraindividual and interpersonal constructs as well. Moreover, future research would do well to continue expanding the repertoire of intraindividual constructs that are systematically investigated in the context of resource

dilemmas, in the hopes that a continually growing body of knowledge generated from such endeavors can contribute towards maximally effective interventions to increase sustainable behaviour toward finite natural resources. The problems that face the natural world, and the human world that exists within it, require such efforts, as without them future policies and interventions may be trying to fix large-scale problems with only half of the picture.

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Appendices

Appendix A – Motivation Toward the Environment Scale (Used in All Studies)

WHY ARE YOU DOING THINGS FOR THE ENVIRONMENT?

There are many behaviors that one can do for the environment. For example, some people recycle old bottles and newspapers, others participate in organizations for the protection of the environment, etc.... Please try to think of behaviors that you do for the environment and indicate them in the space provided: _____. We would like you to consider these behaviors while you complete the following section of the questionnaire. Listed below are several statements concerning possible reasons why people might do environmentally-friendly behaviors. Using the scale from 1-7 below, please indicate the degree to which the proposed reasons correspond to your reasons for doing the environmentally-friendly behaviors you listed above by circling the appropriate number to the right of the item.

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
1. For the pleasure I experience while I am mastering new ways of helping the environment.	1	2	3	4	5	6	7
2. Honestly, I don't know; I truly have the impression that I'm wasting my time doing things for the environment.	1	2	3	4	5	6	7
3. For the pleasure I experience when I find new ways to improve the quality of the environment.	1	2	3	4	5	6	7
4. Because it is a reasonable thing to do to help the environment.	1	2	3	4	5	6	7
5. Because I like the feeling I have when I do things for the environment.	1	2	3	4	5	6	7

	Does not Correspond at all					Corresponds Moderately	Corresponds Exactly
6. I don't really know; I can't see what I'm getting out of it.	1	2	3	4	5	6	7
7. I think I'd regret not doing something for the environment.	1	2	3	4	5	6	7
8. I wonder why I'm doing things for the environment; the situation is simply not improving.	1	2	3	4	5	6	7
9. For the pleasure I get from contributing to the environment.	1	2	3	4	5	6	7
10. Because it's a sensible thing to do in order to improve the environment.	1	2	3	4	5	6	7
11. Because it's a way I've chosen to contribute to a better environment.	1	2	3	4	5	6	7
12. Because other people will be upset if I don't.	1	2	3	4	5	6	7
13. For the recognition I get from others.	1	2	3	4	5	6	7
14. Because I would feel bad if I didn't do anything for the environment.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
15. Because taking care of the environment is an integral part of my life.	1	2	3	4	5	6	7
16. Because my friends insist that I do it.	1	2	3	4	5	6	7
17. Because it seems to me that taking care of myself and taking care of the environment are inseparable.	1	2	3	4	5	6	7
18. Because I would feel guilty if I didn't.	1	2	3	4	5	6	7
19. Because being environmentally-conscious has become a fundamental part of who I am.	1	2	3	4	5	6	7
20. Because it's part of the way I've chosen to live my life.	1	2	3	4	5	6	7
21. Because I would feel ashamed of myself if I was doing nothing to help the environment.	1	2	3	4	5	6	7
22. Because I think it's a good idea to do something about the environment.	1	2	3	4	5	6	7
23. To avoid being criticized.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
24. I don't know; I can't see how my efforts to be environmentally-conscious are helping the environmental situation.	1	2	3	4	5	6	7

****

Scoring Key:

SD Motivation Index: Items #1, 3, 4, 5, 9, 10, 11, 15, 17, 19, 20, 22

NSD Motivation Index: Items #2, 6, 7, 8, 12, 13, 14, 16, 18, 21, 23, 24

Appendix B – Goals Questionnaire for Pilot Study

Strategy Choice in Resource Management Task

Please circle the appropriate response.

To what degree were your goals during the ***practice trials*** in line with the following statements?...

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
1. To make the more money than the other person	1	2	3	4	5	6	7
2. To keep my earnings even with the other person's	1	2		3	4	5	6 7
3. To return as many fish as I could to the lake every round, regardless of my total earnings	1	2	3	4	5	6	7
4. To make the most money that I could every round	1	2	3	4	5	6	7
5. To throw back only as much as was necessary to keep the population stable	1	2	3	4	5	6	7
6. My strategy varied throughout all of the trials as I was trying to figure out how the other person was going to behave	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
7. My strategy was inconsistent because I did not really care that much about the task	1	2	3	4	5	6	7

	Not at all			Somewhat		Very Close	
How close do you feel you were to achieving your goal(s)	1	2	3	4	5	6	7
How satisfied are you with your choice of strategy in the practice trials	1	2	3	4	5	6	7

Please circle the appropriate response.

To what degree were your goals during the ***real trials*** in line with the following statements?...

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
1. To make the more money than the other person	1	2	3	4	5	6	7
2. To keep my earnings even with the other person's	1	2	3	4	5	6	7
3. To return as many fish as I could to the lake every round, regardless of my total earnings	1	2	3	4	5	6	7
4. To make the most money that I could every round	1	2	3	4	5	6	7
5. To throw back only as much as was necessary to keep the population stable	1	2	3	4	5	6	7
6. My strategy varied throughout all of the trials as I was trying to figure out how the other person was going to behave	1	2	3	4	5	6	7
7. My strategy was inconsistent because I did not really care that much about the task	1	2	3	4	5	6	7

	Not at all			Somewhat		Very Close	
How close do you feel you were to achieving your goal(s)	1	2	3	4	5	6	7
How satisfied are you with your choice of strategy in the real trials	1	2	3	4	5	6	7

Appendix C – Goals Questionnaire for Main Studies (Used in Study 1, 2, and 3)

Strategy Choice in Little Gull Lake Task

Listed below are several goals that a person might have while doing the Little Gull Lake Task that you just completed with your partner. Take a moment to reflect on what your goals were during the task. For each item, please indicate whether each of these statements does or does not correspond to your actual goals during the task by circling the appropriate response.

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
1. To make more money than the other person	1	2	3	4	5	6	7
2. To keep my earnings even with the other person's	1	2	3	4	5	6	7
3. To return as many fish as I could to the lake every round, regardless of my total earnings	1	2	3	4	5	6	7
4. To make the most money that I could every round	1	2	3	4	5	6	7
5. To throw back just enough fish to keep the population stable	1	2	3	4	5	6	7
6. My strategy varied throughout all of the trials as I was trying to figure out how the other person was going to behave	1	2	3	4	5	6	7
7. My strategy was inconsistent because I did not really care that much about the task	1	2	3	4	5	6	7

	Not at all			Somewhat		Very Close	
How close do you feel you were to achieving your goal(s)	1	2	3	4	5	6	7

	Not at all			Somewhat		Very Satisfied	
How satisfied are you with your choice of strategy in the real trials	1	2	3	4	5	6	7

*Format above is as the questionnaire appeared in Study 1 and Study 2 of the main studies of this thesis. One item was slightly adjusted for Study 3.

Items Changed in Study 3:

Item #3: “To return as many fish as possible to the lake every round”

Appendix D – Task Motivation Scale for Study 2

Task Motivation Scale (Sanction Free)

*Listed below are several statements concerning possible reasons why you might have chosen to throw back/keep the number of fish that you did (i.e., why you made the decisions that you did during the Little Gull Lake Task). Using the scale from 1-7 below, please indicate the degree to which the proposed reasons correspond to your reasons for keeping/throwing back fish during the Little Gull Lake Task by circling the appropriate number to the right of the item. Each item below provides an alternative ending to the statement "**I chose to act the way I did during the task because…**"*

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
1. I felt driven to make sure my profit was as high as it could be.	1	2	3	4	5	6	7
2. I don't really know; I didn't really see the point to any of it.	1	2	3	4	5	6	7
3. I just made decisions without really caring about the consequences.	1	2	3	4	5	6	7
4. I consider myself to be an environmentally-conscious person, and I wanted my actions to reflect that.	1	2	3	4	5	6	7
5. I felt like acting that way was consistent with who I am.	1	2	3	4	5	6	7
6. The money was more important to me than the fish.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
7. I would have felt guilty otherwise.	1	2	3	4	5	6	7
8. I was genuinely interested in seeing the population of fish stay as large as possible.	1	2	3	4	5	6	7
9. I would have been ashamed of myself if I did not throw back enough fish.	1	2	3	4	5	6	7
10. I believe it is a good thing to have very little negative impact on the environment.	1	2	3	4	5	6	7
11. I didn't see what difference it would make either way.	1	2	3	4	5	6	7
12. Because I enjoyed seeing the lake flourish.	1	2	3	4	5	6	7
13. Of the pleasure I experienced while doing the task.	1	2	3	4	5	6	7
14. I value the health of the environment, so I wanted to act as sustainably as I could in the task.	1	2	3	4	5	6	7
15. I would have felt bad if the population dropped too low.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
16. It was harmonious with my values as a whole.	1	2	3	4	5	6	7
17. I felt it was expected of me to act that way.	1	2	3	4	5	6	7
18. I thought it was important to keep the lake stable.	1	2	3	4	5	6	7

Scoring Key:

SD Motivation Index: 4, 5, 8, 10, 12, 13, 14, 16, and 18

NSD Motivation Index: 2, 3, 7, 9, 11, 15, & 17 (Items #1 and 6 were removed after reliability tests)

Task Motivation Scale (Sanctions)

*Listed below are several statements concerning possible reasons why you might have chosen to throw back/keep the number of fish that you did (i.e., why you made the decisions that you did during the Little Gull Lake Task). Using the scale from 1-7 below, please indicate the degree to which the proposed reasons correspond to your reasons for keeping/throwing back fish during the Little Gull Lake Task by circling the appropriate number to the right of the item. Each item below provides an alternative ending to the statement "**I chose to act the way I did during the task because…**"*

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
1. I felt driven to make sure my profit was as high as it could be.	1	2	3	4	5	6	7
2. I don't really know; I didn't really see the point to any of it.	1	2	3	4	5	6	7
3. I just made decisions without really caring about the consequences.	1	2	3	4	5	6	7
4. I consider myself to be an environmentally-conscious person, and I wanted my actions to reflect that.	1	2	3	4	5	6	7
5. I felt like acting that way was consistent with who I am.	1	2	3	4	5	6	7
6. I wanted to avoid as many punishments as possible.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
7. I would have felt guilty otherwise.	1	2	3	4	5	6	7
8. I was genuinely interested in seeing the population of fish stay as large as possible.	1	2	3	4	5	6	7
9. I would have been ashamed of myself if I did not throw back enough fish.	1	2	3	4	5	6	7
10. I believe it is a good thing to have very little negative impact on the environment.	1	2	3	4	5	6	7
11. I wanted to get as many of the rewards as I could.	1	2	3	4	5	6	7
12. I didn't see what difference it would make either way.	1	2	3	4	5	6	7
13. Because I enjoyed seeing the lake flourish.	1	2	3	4	5	6	7
14. Of the pleasure I experienced while doing the task.	1	2	3	4	5	6	7
15. I value the health of the environment, so I wanted to act as sustainably as I could in the task.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
16. I would have felt bad if the population dropped too low.	1	2	3	4	5	6	7
17. It was harmonious with my values as a whole.	1	2	3	4	5	6	7
18. I felt it was expected of me to act that way.	1	2	3	4	5	6	7
19. I thought it was important to keep the lake stable.	1	2	3	4	5	6	7

Scoring Key:

SD Motivation Index: Items #4, 5, 8, 10, 13, 14, 15, 17, and 19

NSD Motivation Index: Items #1, 2, 3, 6, 7, 9, 11, 12, 16, and 18

Appendix E – Partner's Perceived Strategy Scale (Used in Study 2 and 3)

Partner's Perceived Strategy Scale

Listed below are several goals that a person might have while doing the Little Gull Lake Task that you just completed with your partner. Take a moment to reflect on what you think your partner's goals were during the task. For each item, please circle whether you think that this was strongly a goal of your partner, or not at all.

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
1. To make more money than you.	1	2	3	4	5	6	7
2. To keep their earnings even with yours.	1	2	3	4	5	6	7
3. To return as many fish as they could to the lake every round, regardless of their total earnings.	1	2	3	4	5	6	7
4. To make the most money that they could every round.	1	2	3	4	5	6	7
5. To throw back just enough to keep the population stable.	1	2	3	4	5	6	7
6. Their strategy varied throughout all of the trials because they were trying to figure out what I was doing.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
7. Their strategy was inconsistent because they did							
Not really seem to care that much about the task	1	2	3	4	5	6	7

Appendix F – Task Aptitude Scale (Used in Study 2 and 3)

Task Aptitude Questionnaire

*Each of the statements below provides alternative endings to the statement "**when I was doing the task…**" regarding how well you felt you understood the task and felt capable within it. Using the scale from 1-7 below, please indicate the degree to which the proposed statements correspond to how you actually felt during the Little Gull Lake Task by circling the appropriate number to the right of the item.*

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
1. I knew what I was doing.	1	2	3	4	5	6	7
2. I was not able to achieve the goals I wanted to during the task.	1	2	3	4	5	6	7
3. I was able to accomplish the goals that I wanted to accomplish.	1	2	3	4	5	6	7
4. I understood the task well.	1	2	3	4	5	6	7
5. I did not feel like I was very good at the task.	1	2	3	4	5	6	7
6. If there was something that I did not understand at first, I could figure it out for myself.	1	2	3	4	5	6	7
7. I was confused during most of the task.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
8. I mastered the task by the time it was finished.	1	2	3	4	5	6	7
9. I did not really grasp the rules/guidelines of the task as much as I wanted to.	1	2	3	4	5	6	7

Appendix G – Perceived Interest-Enjoyment Questionnaire (Used in Study 2 and 3)

Perceived Interest-Enjoyment Questionnaire

*Each of the words/descriptions below provides alternative endings to the statement "**when I was doing the task…**" regarding how you felt during the task. Using the scale from 1-7 below, please indicate the degree to which the words/descriptions correspond to how you actually felt during the Little Gull Lake Task by circling the appropriate number to the right of the item.*

	Does not Correspond at all			Corresponds Moderately		Corresponds Exactly	
1. I did not find it very stimulating.	1	2	3	4	5	6	7
2. I felt energized while I was doing the task.	1	2	3	4	5	6	7
3. I found it interesting.	1	2	3	4	5	6	7
4. I was bored.	1	2	3	4	5	6	7
5. I had fun.	1	2	3	4	5	6	7
6. I found it to be engaging.	1	2	3	4	5	6	7
7. I felt drained by the time it was over.	1	2	3	4	5	6	7
8. I thought it was dull.	1	2	3	4	5	6	7

Appendix H – Task Motivation Scale for Study 3

Task Motivation Scale (Sanction Free)

*Listed below are several statements concerning possible reasons why you might have chosen to throw back/keep the number of fish that you did (i.e., why you made the decisions that you did during the Little Gull Lake Task). Using the scale from 1-7 below, please indicate the degree to which the proposed reasons correspond to your reasons for keeping/throwing back fish during the Little Gull Lake Task by circling the appropriate number to the right of the item. Each item below provides an alternative ending to the statement "**I chose to act the way I did during the task because…**"*

		Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
1.	I felt driven to make sure my profit was high.	1	2	3	4	5	6	7
2.	I don't really know; I didn't really see the point to any of it.	1	2	3	4	5	6	7
3.	I just made decisions without really caring about the consequences.	1	2	3	4	5	6	7
4.	I consider myself to be an environmentally-conscious person, and I wanted my actions to reflect that.	1	2	3	4	5	6	7
5.	I felt like acting that way was consistent with who I am.	1	2	3	4	5	6	7
6.	The money was quite important to me.	1	2	3	4	5	6	7
7.	I would have felt guilty otherwise.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
8. I was genuinely interested in seeing the population of fish grow.	1	2	3	4	5	6	7
9. I would have been ashamed of myself if I did not throw back enough fish.	1	2	3	4	5	6	7
10. I believe it is a good thing not to cause harm to the environment.	1	2	3	4	5	6	7
11. I didn't see what difference it would make either way.	1	2	3	4	5	6	7
12. Because I enjoyed seeing the lake flourish.	1	2	3	4	5	6	7
13. Of the pleasure I experienced while doing the task.	1	2	3	4	5	6	7
14. I value the health of the environment, so I wanted to act sustainably in the task.	1	2	3	4	5	6	7
15. I would have felt bad if the population dropped too low.	1	2	3	4	5	6	7
16. It was harmonious with my values as a whole.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
17. I felt it was expected of me to act that way.	1	2	3	4	5	6	7
18. I thought it was important to keep the lake stable.	1	2	3	4	5	6	7

Scoring Key:

SD Motivation Index: Items #4, 5, 8, 10, 12, 13, 14, 16, and 18

NSD Motivation Index: Items #1, 3, 6, 7, 11, and 17 (items #2, 9 and 15 were removed after reliability tests)

Task Motivation Scale (Sanctions)

*Listed below are several statements concerning possible reasons why you might have chosen to throw back/keep the number of fish that you did (i.e., why you made the decisions that you did during the Little Gull Lake Task). Using the scale from 1-7 below, please indicate the degree to which the proposed reasons correspond to your reasons for keeping/throwing back fish during the Little Gull Lake Task by circling the appropriate number to the right of the item. Each item below provides an alternative ending to the statement "**I chose to act the way I did during the task because…**"*

		Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
1.	I felt driven to make sure my profit was high.	1	2	3	4	5	6	7
2.	I don't really know; I didn't really see the point to any of it.	1	2	3	4	5	6	7
3.	I just made decisions without really caring about the consequences.	1	2	3	4	5	6	7
4.	I consider myself to be an environmentally-conscious person, and I wanted my actions to reflect that.	1	2	3	4	5	6	7
5.	I felt like acting that way was consistent with who I am.	1	2	3	4	5	6	7
6.	The money was quite important to me.	1	2	3	4	5	6	7
7.	I wanted to administer a financial punishment at each opportunity.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
8. I would have felt guilty otherwise.	1	2	3	4	5	6	7
9. I was genuinely interested in seeing the population of fish grow.	1	2	3	4	5	6	7
10. I would have been ashamed of myself if I did not throw back enough fish.	1	2	3	4	5	6	7
11. I believe it is a good thing not to cause harm to the environment.	1	2	3	4	5	6	7
12. I wanted to give a monetary reward at each opportunity.	1	2	3	4	5	6	7
13. I didn't see what difference it would make either way.	1	2	3	4	5	6	7
14. I enjoyed seeing the lake flourish.	1	2	3	4	5	6	7
15. I wanted to let my partner know I was not happy with how they were behaving at each opportunity.	1	2	3	4	5	6	7

	Does not Correspond at all			Corresponds Moderately			Corresponds Exactly
16. Of the pleasure I experienced while doing the task.	1	2	3	4	5	6	7
17. I value the health of the environment, so I wanted to act sustainably in the task.	1	2	3	4	5	6	7
18. I would have felt bad if the population dropped too low.	1	2	3	4	5	6	7
19. It was harmonious with my values as a whole.	1	2	3	4	5	6	7
20. I felt it was expected of me to act that way.	1	2	3	4	5	6	7
21. I thought it was important to keep the lake stable.	1	2	3	4	5	6	7
22. I wanted to communicate with my partner in a positive way at each opportunity.	1	2	3	4	5	6	7

Scoring Key:

SD Motivation Index: Items # 4, 5, 9, 11, 14, 16, 17, 19, 21, and 22

NSD Motivation Index: Items #1, 3, 6, 8, 13, and 20 (items #2, 7, 10, 12, 15 and 18 were removed after reliability tests).