

From Tragedy to Benefit of the Commons: Increasing Psychological Ownership to  
Increase Stewardship

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ABSTRACT

Public goods, or resources shared among a group of individuals, are often exploited when each individual puts self-interest ahead of group interest, a dilemma known as the tragedy of the commons. Recent research on psychological ownership has shown that peoples' feelings of ownership can increase resource valuation, even for items not legally owned. Furthermore, subtle manipulations are capable of increasing psychological ownership and resultant valuation. The authors propose that increasing an individual's psychological ownership for a public good can lead to higher valuation and greater stewardship of the resource, thus offering a solution to the tragedy of the commons. The authors investigate this proposed effect in two online studies, an incentive-compatible lab study, and two field studies; results indicate that subtle manipulations based on antecedents of psychological ownership increase psychological ownership and behavior that preserves the common good.

Keywords: psychological ownership, tragedy of the commons, public goods, green marketing, stewardship

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Many public resources, such as local parks and lakes, unrestricted roadways, and the scenic view from your nearby hiking trail, are available for all members of a society to freely use. Unfortunately, there is a risk that individuals will put self-interest ahead of common interest and fail to adequately care for those public resources. For example, open grazing land may be overused by the ranchers who put their livestock onto it, public lakes may be overfished, and parks and roadsides may succumb to litter. This neglect of common resources as compared to singularly owned resources is known in economics as the tragedy of the commons (Hardin 1968; Ostrum 1990). The insight of the tragedy of the commons is that common ownership leads to a diffusion of responsibility among community members, such that no one individual steps forward to provide stewardship for the resource.

How might an organization or society work to encourage better care of a shared resource? Traditional solutions have included exclusive property rights, contractual arrangements, taxation, and various types of enforcement and laws regarding their use. We hereby offer a novel and more flexible solution for increasing stewardship of common goods. Recent research on psychological ownership that has shown that peoples' perceptions of ownership can increase resource valuation, even for items not legally owned (Peck and Shu 2009). Building upon this idea, we propose that increases in psychological ownership for common resources can lead to investments and behaviors that result in better care for such resources. In essence, by making individuals feel stronger ownership toward a public resource, he or she becomes more likely to take on some of the responsibility of taking care of it. If successful, simple interventions that increase psychological ownership can be applied to a variety of public goods situations where society will benefit from improved stewardship.

We begin with an overview of the work on public goods, and especially findings in economics about the prevalence of public goods dilemmas and methods for testing them in experimental settings. We then move on to describing the concept of psychological ownership and its use in both the organizational and marketing literature. Along the way, we examine three antecedents of psychological ownership - investing the self in the target, controlling the target, and coming to intimately know the target (Pierce, Kostova and Dirks 2001, 2003) - and their relationship to psychological ownership for shared items. From there we are able to generate a simple hypothesis about how subtle manipulations of the antecedents of psychological ownership can be used to affect both felt ownership and actual behavior toward common goods. To test this hypothesis, we present data from two online studies, an incentive-compatible lab study, and two field studies.

Our first field study is a pilot study that shows that a simple manipulation of psychological ownership can affect actual behavior toward a non-owned resource: a hotel room. Specifically, we find evidence that when guests have more control (choosing their room), an antecedent of psychological ownership, they take better care of the resource by leaving the room cleaner. A second pilot study, run online, is a correlational study of rental car experiences that finds that similar control (choosing the car) leads to self-reported psychological ownership. Our remaining studies link the concepts together directly, using known antecedents of psychological ownership to manipulate the feeling of ownership and then directly measuring both psychological ownership and subsequent willingness to pay or contribute (Studies 1 and 2) and actual stewardship behavior in a field setting (Study 3). We consistently find that efforts to increase psychological ownership do appear to increase care for common resources, offering promising interventions for increasing the care of public goods.

## *THE TRAGEDY OF THE COMMONS*

A shared set of resources, to which multiple individuals have access, is likely to be depleted, a concept known as the tragedy of the commons (Hardin 1968). The tragedy occurs because each person tries to maximize his own beneficial outcomes in regard to the common resource without investing appropriate effort into maintaining that resource for others' use. Additional use of the resource has positive benefits for the individual (e.g., enjoying a sunny day boating on a public lake) but also comes with costs that are shared among the full set of owners (increased pollution and crowding from many boaters). Since each individual does what is best for him or herself, over time the resource breaks down and becomes less valuable.

Hardin (1968), who coined the term, argued that the tragedy of the commons has no “technical” (i.e., scientific) solution and could only be resolved through morality. In an effort to externally impose morality, communities would need to develop a system of laws and rules (mutual coercion) to restrict use of the shared resource. In other words, external punishments would need to be put in place to change the incentive system for using the resource such that each individual restrained their own use appropriate to the greater community needs.

In the years since the tragedy of the commons was first defined, other researchers have considered ways to counteract it. Most prominent among these researchers was Nobel Prize winner Elinor Ostrom, who proposed methods for governing common pool resources. She demonstrated that communities can jointly care for shared resources as long as there are clear, publicly known laws shared by the members of the community. One of Ostrom's several important design principles for shared resource management is that the community members should each participate in the rule setting for the resource, suggesting a level of control for each individual (Ostrom 1990; Poteete and Ostrom 2010). Social influences on contribution levels,

driven through psychological factors like reciprocity, conformity, and/or altruism, have also been explored (Akerlof 1982; Andreoni 1990; Sugden 1984). For example, finding out about other people's large donations to public radio (Shang and Croson 2009) or reuse of towels in a hotel room (Goldstein, Cialdini, and Griskevicius 2008) prompts social norms that influence care of common resources. However, it is important to note that such systems are still primarily socially driven rather than individually motivated, with either explicit punishments (via fines and incentives) or implicit norms to encourage community members to adhere to the rules.

Ideas regarding public goods, and how and when individuals do or do not cooperate in their care, have been brought into the laboratory within the experimental economics and game theory literature. Ledyard (1995) provides a comprehensive review of experimental research on public goods (also see Croson 2010 and Mitchell and Carson 1989). The typical experimental setup is for a group of around four individuals (often undergraduate students) to come into the lab and each receive an endowment of resources. They are then invited to privately invest some or all of their individual resources into a common pool, which is counted up by the researcher, doubled, and reallocated to each member. A dollar contributed by one group member becomes \$2 in the common pool, divided by four members, resulting in only fifty cents back to the original contributor. But if all members contribute their full endowment, each member gets back double their investment. Key elements of the public good dilemma are thus captured in the experiment, since the group as a whole benefits from individual contributions but each individual benefits the most by holding onto their own endowment and free-riding on the contributions of others.

Normative theory suggests that contributions to the common good should be low or zero, and yet some level of cooperation often does occur in these experiments, with typically 40 to 60

percent of the original endowments contributed. Explanations for this behavior include altruism and group norms of reciprocity and fairness (Dawes and Thaler 1988). Contributions increase when communication is allowed between players (Dawes, McTavish, and Shaklee 1977) but decrease when there are multiple rounds of the game (Isaac, McCue, and Plott 1985), with experience from prior games (Isaac, Walker, and Thomas 1984), and with training in economics (Marwell and Ames 1981). If players are allowed to build up a reputation for reciprocity through multiple rounds, this also appears to increase contribution rates (Milinski, Semmann, and Krambeck 2002). Limited efforts to bring these types of lab study designs into field settings have found similar results, especially regarding the value of face-to-face communication for increasing cooperation rates (Cardenas 2000). One key finding from this field work is that while groups may successfully generate their own internal rules for punishing defectors, rules and regulations imposed externally for punishing defectors can actually harm socially oriented behavior and make the overall group worse off (Cardenas 2000).

Summarizing both the theoretical and empirical evidence, while theoretically proposed solutions to the tragedy of the commons or public goods problems often recommend additional authority or rules, the empirical evidence leans toward encouraging reciprocity via communication and implicit norms. Unfortunately, while developing strong reciprocity norms via communication can work in the lab, it may be especially difficult with large and diffuse groups, as is usually the case for many public goods. The most extreme solution is to convert the common property into private property so that a single owner has responsibility for maintenance. Instead, given the findings that psychological ownership can be independent of legal ownership, we wondered whether it was possible to make each shared owner or community member feel as if the resource was privately owned, without actually changing the ownership. Would increased

feelings of ownership be enough to trigger the “morality” suggested by Hardin that is required to care for the resource? If so, then an internally motivated behavioral solution, rather than a socially driven incentive or influence based solution, may be available for maintaining shared resources. Specifically, we propose that psychological ownership may operate as a possible solution to the tragedy of the commons, and can be triggered through several known antecedents of psychological ownership.

### *PSYCHOLOGICAL OWNERSHIP*

One way to encourage care for common resources is to increase the feeling of ownership, or psychological ownership, for those shared resources. Psychological ownership has been defined as when an individual feels that the target of ownership is “theirs” and that they are psychologically tied to an object (Pierce, Kostova and Dirks 2001). In workplace settings, psychological ownership has been found to result in extra effort by employees, and higher engagement in activities that are not formally rewarded by the organization (Vandewalle, VanDyne and Kostova 1995). Employees feeling psychological ownership in the workplace feel more commitment to the organization and a greater interest in the success of the organization (Pierce and Gregorsen 1991; Vandewalle et al 1995). Employees in an organization with greater psychological ownership are also more likely to be better citizens in the organization, including volunteering to do things for their work group and helping to orient new employees (VanDyne and Pierce 2004). More broadly, ownership is imbued with a sense of responsibility or stewardship to protect and care for the target of ownership (Furby 1978; Pierce, Kostova and Dirks 2001). If we can increase the feeling of ownership for public goods, even those not legally owned, this allows us to begin to address the problem of the tragedy of the commons.



The antecedents of psychological ownership can be thought of as levers that can be moved to increase the feeling of ownership, with the anticipated consequence of taking better care of the shared resource. Pierce, Kostova, and Dirks (2001, 2003) identify three antecedents to psychological ownership: investing the self into the target, controlling the target, and coming to intimately know the target. They maintain that if any of these antecedents is increased, the overall feeling of ownership towards the object is increased.

Investing the self into the target refers to the investment of an individual's time, effort, financial resources, attention and energy into the target (Pierce, Kostova, and Dirks 2001). This investment of the self increases the feeling of ownership. As discussed in Pierce et al (2001), Locke (1690) felt that we own what we produce since we invest our labor in the process. This is supported by research that found that people value an object more if they make an object, termed the IKEA effect (Norton, Mochon and Ariely 2012). While not directly measured, one reason that the IKEA effect may increase object valuation is that the feeling of ownership increases through higher investment of the self, since increases in perceived ownership have been found to increase object valuation (Peck and Shu 2009; Shu and Peck 2011). Four-year-old children are more likely to infer ownership if someone made a picture (Nancekivell and Friedman 2014), or if someone creatively modified it (Kanngiesser, Gjersoe and Hood 2010), both investments of labor.

The second antecedent, controlling the target, includes the ability to use an object and to decide who else uses an object (Rudmin and Berry 1987). Children as young as three years old infer that an object belongs to the person who decides whether others may use it (Neary, Friedman and Burnstein 2009). Even physical control such as merely touching an object (Peck and Shu 2009) or imagining touching an object (Peck, Barger and Webb 2013) leads to an

increase in psychological ownership. It is also true that controlling aspects of a service or process leads to a greater feeling of ownership (Asatryan and Oh 2008). Controlling the design process in a virtual application has also been found to lead to greater psychological ownership (Lee and Chen 2011) and Kirk and Swain (2013) found that control over a digital object increased feelings of ownership. Belk (1988, 2013) and Weiss and Johar (2013) examine possessions as extensions of the self as they reflect our identities. When something is part of the self, it is controllable.

The final antecedent of psychological ownership is coming to intimately know the target. This is often discussed as being associated and familiar with the target (Beggan and Brown 1994; Pierce, Kostova, and Dirks 2001; Rudmin and Berry 1987). If a person has more information and knowledge about an object, they feel more ownership towards it. For example, a person may feel a local restaurant is “their” restaurant because they frequently eat there.

While the idea of increasing psychological ownership for public goods as a path to stewardship is entirely new, there is some indication from prior literature that individuals will value public goods more highly if they already feel a personal attachment to those resources. Korobkin (2003) reviews a quantity of evidence implying strong endowment effects for public goods, including environmental protection. For example, duck hunters asked about the value in protecting wetlands from development were willing to pay \$247 per season, but required \$1044 to give up existing entitlements to the public space (Hammack and Brown 1974). Similar differences in willingness to pay and willingness to accept are reported for elk hunters, fishermen, and goose hunters when asked about valuation for public lands (e.g., Schulze, D'Arge, and Brookshire 1981) and also for community residents who were asked about changes in air visibility (Rowe, D'Arge, and Brookshire 1980). Such results prompt Korobkin to theorize that individuals feel entitled to public goods such as clean air the same as they do to legally owned

items, “even if you have no well-defined property right in clean air that could plausibly be called ‘ownership’” (Korobkin 2003, pg 1229). He further suggests attachment as a possible mechanism for these effects, describing the duck hunters as making a distinction between “their” wetland versus merely “a” wetland (pg. 1251).

Putting together the work on psychological ownership, public goods, and endowment, our hypothesis is that manipulations of antecedents of ownership, including investing the self in the resource, controlling the resource, and coming to intimately know the resource, can increase psychological ownership and subsequently increase valuation and stewardship of a common good. We test both the individual pieces and the full relationship of these concepts in our studies. In our pilot studies, we examine how control and knowing the resource can increase either actual care behavior (pilot study 1) or measured psychological ownership (pilot study 2). In Study 1, we run an online study that separately tests all three antecedents of ownership (relative to a neutral non-ownership condition) to see how they affect both measured psychological ownership and reported willingness to contribute for a variety of common goods. In Study 2, we employ standard experimental economics approaches to tests of public goods in an incentive-compatible laboratory study in which participants must decide how much of their own resources to contribute to a common good. Finally, in Study 3, we return to the field with a direct test of how increasing psychological ownership can lead to increased stewardship of a local lake, as measured through efforts to clean trash off the lake while individuals are enjoying its use.

### *PILOT STUDY 1: HOTEL FIELD EXPERIMENT-CONTROL AND CONSEQUENCES*

#### *Overview and Method*

Before looking closely at the relationship between the antecedents of psychological ownership and the feeling of ownership, we wanted to conduct an experiment to determine causation by directly manipulating an antecedent of ownership and then measuring subsequent behavior and care of the shared resource. The setting for this study was a hotel in a university town.

This study had two conditions: guests were either assigned a room as usual ( $n = 42$ ) or they had a choice between 2 different rooms ( $n = 39$ ). As part of the hotel's desire to assess customer opinions, a survey was left in the room for the guests to fill out and return. Included in the survey was a measure of satisfaction with the hotel ("How satisfied were you with your hotel stay?" 1=not at all satisfied, 7=very satisfied), a question about returning to the hotel ("How likely are you to stay at the hotel in the future?" 1=extremely unlikely, 7=extremely likely), and whether they were likely to tell others about the hotel. Finally, to measure whether choosing the room affected actual behavior, which is key to our study, we asked the cleaning staff to track how clean the room was after the guest checked out. The cleaning staff was blind to both the hypothesis of the study and the assignment of guests to condition.

### *Results and Discussion*

Interestingly, in the choice condition, many guests seemed unsure of which room to choose and asked the hotel staff what room they would choose. But, even though the guests may not have initially seemed to appreciate having a choice, it made a difference on several measures including their satisfaction with their stay, whether they would stay in the future, whether they would tell others, and how clean they left their room. As may be expected, having a choice of room resulted in significantly greater satisfaction with their hotel ( $M_{\text{choice}} = 6.13$ ,  $M_{\text{no choice}} = 5.76$ ,  $F(1, 79) = 3.83$ ,  $p = .054$ ) and a greater likelihood of staying at the hotel in the future ( $M_{\text{choice}} =$

6.15,  $M_{\text{no choice}} = 5.57$ ,  $F(1, 79) = 5.68$ ,  $p = .02$ ). Guests who could choose also indicated that they were more likely to tell others about the hotel in the future ( $M_{\text{choice}} = 6.28$ ,  $M_{\text{no choice}} = 5.64$ ,  $F(1, 79) = 10.61$ ,  $p = .002$ ). It should be noted that even though these differences are significant, the overall means on these measures are very high regardless of room choice; in both conditions, people are generally extremely satisfied with the hotel, would likely stay in the future, and will likely tell others about their experience.

Finally, and most importantly to our theory, the hotel cleaning staff noted how clean the room was when guests checked out. The scale was 1-5 with 1-very messy, 2- messy, 3 average, 4=clean, and 5-very clean. Guests who were allowed to choose their own room left the room cleaner, as judged by the staff ( $M_{\text{choice}} = 4.00$ ,  $M_{\text{no choice}} = 3.57$ ,  $F(1, 79) = 4.18$ ,  $p = .04$ ). Cleaning services also noted when people asked to have their towels and sheets cleaned. However, most people recycled their towels and sheets during their stays, and the number of visitors that had them cleaned was distributed evenly across the choice and no choice conditions.<sup>1</sup> In general, people seem to be aware of the environmental impact of washing towels/sheets when it is unnecessary, and the ability to choose a room did not affect this particular behavior even though it did affect overall cleanliness. In sum, results indicate that a subtle manipulation such as having guests choose their own hotel rooms increases both satisfaction and consumer behavior around stewardship of the resource.

## *PILOT STUDY 2: CONTROLLING AND INTIMATELY KNOWING THE TARGET*

### *Overview and Method*

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<sup>1</sup> Only 15 people had their towels cleaned, with 6 people being in the no room choice condition, and 9 being in the choice condition (a non-significant difference). Only 7 guests had their sheets cleaned, with four people in the no choice condition, and 3 in the choice condition, a non-significant difference.

Our second exploratory study used natural variations in car rental procedures as a manipulation of the antecedents of psychological ownership. Some car rental firms allow consumers to select their own car, while others assign a car. We expected that when a consumer can choose their own car, they would feel more psychological ownership compared to when the car is assigned, since the consumer has more control. We also hypothesized that if a person rents a car for a longer period of time, they will more intimately know the car and will feel more psychological ownership compared to a consumer who rents for a shorter time.

We administered a questionnaire ( $n=566$ ) in the context of a car rental. Participants were given the survey and paid for their time through a national online survey firm (Qualtrics). We asked each respondent if they had rented a car recently, whether they were allowed to select the car (control) and the length of the rental (intimately knowing). We then administered the 3-item scale for psychological ownership of the rental car with items “I felt personal ownership of the vehicle,” “I felt that this was my vehicle,” and “I felt like I owned this vehicle,” all measured on a 7 point scale with 1 = “strongly disagree” and 7 = “strongly agree” (adapted from Peck and Shu 2009,  $\alpha = .96$ ). Also included were several other questions about satisfaction with their rental and the condition in which it was returned to the rental agency (clean, filled with gas, etc.; see appendix 1 for measures).

### *Results and Discussion*

We start with our main question of whether or not picking out your own car from the rental fleet has a significant effect on psychological ownership for that rental car. As expected, both selection of the car ( $r = .30$ ) and length of rental ( $r = .16$ ) were positively correlated with psychological ownership. In a regression with psychological ownership as the dependent variable, selection of the car and length of rental predicted ownership  $F(3, 499)=22.08$ , Adj  $R^2$

=.11. Whether a consumer was able to select a car was positively related to their feeling of ownership ( $\beta = 1.21, p < .001$ ), as was the length of time that they rented the car ( $\beta = .018, p < .001$ ). Note that the effect of picking one's own car has a large effect on the psychological ownership measure, increasing it by a full point (from 2.3 to 3.3 on a 7-point scale).

We also wanted to see whether increased psychological ownership in this context may affect subsequent behavior, such as cleaning the rental car or returning it filled with gas. The measures for our sample on these behaviors were high across conditions, and did not have enough variance to show significant differences according to either selecting one's own vehicle or feelings of ownership ( $M_{\text{cleanliness}} = 5.82, M_{\text{condition}} = 6.31$ , neither measure significantly different from 7 at  $p < .001$ ).

These two pilot studies provide initial evidence of aspects of our hypothesis linking antecedents of ownership, psychological ownership, and stewardship of common resources. However, each pilot study has several constraints. First, each study tests only partial links in our overall theory rather than providing a full test of the model. Second, the resources in these studies are rented resources rather than true public goods, implying that the individual may feel stronger rights and responsibilities toward them than they would for a resource that is free to everyone. To test the full set of linkages, we now move on to more complete studies of the ways in which psychological ownership may be manipulated to improve stewardship of common goods.

## *STUDY 1: SHARED RESOURCES AND MANIPULATIONS OF OWNERSHIP*

### *Overview and Method*

While the two pilot studies lend support to the relationship between the antecedents of psychological ownership and the feeling of ownership or stewardship behavior, we wanted to conduct an experiment to determine causation by directly manipulating antecedents of psychological ownership and then testing its effect on both the measure of psychological ownership and the stewardship of the resources. Stewardship was operationalized as the willingness to pay for and/or contribute to the shared resource. Further, unlike the hotel study or rental car study where the resource was a rented space rather than a public space (thus providing some sense of “borrowed” ownership), the scenarios in this study were all designed to be truly not owned (or rented) by the individual.

The design of the study included twelve conditions in a 3 (resource) X 4 (ownership manipulation) between-subjects design. Each participant saw and responded to only one scenario. The study was run on Amazon Mechanical Turk with n=1026 respondents. The three resources in the scenarios were (1) a local family orchard near your home filled with peach trees, (2) a fish pond at a local public park, and (3) an all-volunteer local boat club. Three ownership manipulations were designed to focus on the three antecedents of psychological ownership: control, investment of the self, and knowledge. For example, for the local fish pond, participants in the control condition were told that they were “on the committee to help maintain the pond, including making decisions about what fish to stock it with and what dates to allow fishing.” Participants in the investment condition were told that they “made a contribution several years ago when the pond was first being established to help stock it with fish,” and those in the knowledge condition were told “you have fished here yourself many times over the years, and have some favorite spots along the shore where you like to cast your line.”



The fourth psychological ownership manipulation was a no-ownership condition, where no antecedents of psychological ownership were provided in the scenario description. After reading the scenario, participants answered a question to test their attention and understanding of the scenario, indicated their willingness to contribute to the resource, and then answered our three-item psychological ownership questions about the resource. All materials for this study are included in appendix 2.

### *Results and Discussion*

Since the three resources used in the scenarios had different dependent measures, we analyze each group separately. Altogether, 340 participants responded to the orchard scenario, 338 participants responded to the pond scenario, and 348 participants responded to the boat club scenario, with four different ownership manipulations per scenario.

*Orchard.* The primary dependent measures in the orchard scenario were the three-item psychological ownership measure ( $\alpha = .87$ ) and participants' willingness to pay for one pound of peaches, collected on a \$1 to \$5 slider scale. As expected, we found that the scenarios that manipulated the antecedents of ownership did increase the measured psychological ownership toward the orchard. Compared to the baseline scenario with no ownership manipulation, psychological ownership was significantly greater for participants who were told they could pick the peaches themselves (ability to control condition: 3.03 vs. 2.43,  $t(336) = 2.45, p = .01$ ), who were told they knew the orchard since they were children (knowledge condition: 3.28 vs. 2.43,  $t(336) = 3.32, p = .001$ ), and who were told they had volunteered to work there on summer weekends (investment condition: 3.07 vs. 2.43,  $t(336) = 2.55, p = .01$ ). The willingness to pay measure showed a similar pattern, with one interesting exception. Willingness to pay for a pound of peaches was significantly higher in the ability to control condition relative to the baseline

condition (\$2.43 vs. \$2.08,  $t(336) = 3.18, p = .002$ ) and was marginally significantly higher in the knowledge condition relative to baseline (\$2.29 vs. \$2.08,  $t(336) = 1.83, p = .07$ ) but was not significantly different for the investment condition relative to baseline (\$2.02 vs. \$2.08,  $t(336) = -.58, p = .57$ ). We'll return to why the effect may not persist in the investment condition in our discussion below.

We also tested whether the psychological ownership measure could serve as a mediator between the condition assignment and the willingness to pay measure. We found the mean indirect effect from the bootstrap mediation analysis is positive but not significant ( $a \times b = .03$ ), with a 95% confidence interval including zero (-.010 to .070). In the indirect path, the ownership conditions significantly increase psychological ownership by  $a = .684$ ;  $b = .043$ , so holding constant the condition, a unit increase in psychological ownership significantly increases willingness to pay by \$0.04. The direct effect of condition c (.143) is also not significant once psychological ownership is included ( $p = .14$ ), suggesting that mediation is not occurring for this set of scenarios, possibly due to the lack of increased WTP for the investment condition.

*Fish pond.* For the scenarios about the fish pond in the local public park, the primary dependent measures were the three-item psychological ownership measure ( $\alpha = .83$ ) and how much of a \$6 annual entitlement (raised from fishing fees) participants would like to reinvest into the pond for future upkeep. Again we find that the scenarios that manipulated the antecedents of ownership increase the measured psychological ownership toward the pond. Compared to the baseline scenario with no ownership manipulation, psychological ownership was significantly higher for participants who were told they were involved in the committee to oversee the pond (ability to control condition: 3.98 vs. 3.09,  $t(334) = 4.00, p < .001$ ), who were told they fish at the pond regularly (knowledge condition: 3.59 vs. 3.09,  $t(334) = 2.06, p = .04$ ), and who were

told they had contributed to establish the pond when it was started (investment condition: 3.81 vs. 3.09,  $t(334) = 3.02, p = .003$ ).

The contribution measure showed a similar pattern to the ownership measures. Participants were willing to reinvest more of their entitlement back into the pond in the ability to control condition relative to the baseline condition (\$3.86 vs. \$3.11,  $t(334) = 2.63, p = .009$ ), in the knowledge condition relative to baseline (\$4.23 vs. \$3.11,  $t(334) = 3.61, p < .001$ ), and in the investment condition relative to baseline (\$4.40 vs. \$3.11,  $t(334) = 4.18, p < .001$ ). Again, the psychological ownership measure was tested as a mediator between the condition assignment and the payment measure. The mean indirect effect from the bootstrap mediation analysis is positive and significant ( $a \times b = .202$ ), with a 95% confidence interval excluding zero (.042 to .362). In the indirect path, the three ownership conditions significantly increase psychological ownership by  $a = .727$ ;  $b = .278$ , so holding constant condition, a unit increase in psychological ownership significantly increases willingness to reinvest by \$0.28. The direct effect of condition  $c (.824)$  does continue to be significant ( $p = .001$ ), indicating complementary mediation.

*Boat club.* The last set of scenarios was about a local boat club. For these, the primary dependent measures were the three-item psychological ownership measure ( $\alpha = .90$ ) and participants' willingness to contribute to some boathouse upgrades, collected on a \$0 to \$20 slider scale. We again found that the scenarios that manipulated the antecedents of ownership increased the measured psychological ownership. Compared to the baseline scenario with no ownership manipulation, psychological ownership was significantly higher for participants who were told they were part of the club's organizing committee (ability to control condition: 3.59 vs. 2.97,  $t(344) = 2.57, p = .01$ ), who were told had been spending a large amount of time at the boathouse (knowledge condition: 3.52 vs. 2.97,  $t(344) = 2.22, p = .03$ ), and who were told they

had volunteered to help out with repairs and repainting on weekends (investment condition: 3.52 vs. 2.97,  $t(344) = 2.23, p = .03$ ). Similar to the orchard scenarios, we find that the contribution measure shows a similar pattern to ownership with the exception of the investment condition. The contribution level for boathouse upgrades was significantly higher in the ability to control condition relative to the baseline condition (\$11.31 vs. \$9.50,  $t(344) = 1.96, p = .05$ ) and in the knowledge condition relative to the baseline condition (\$12.22 vs. \$9.50,  $t(344) = 2.91, p = .004$ ). However, contribution levels in the investment condition were not significantly higher than the levels in the baseline condition (\$10.38 vs. \$9.50,  $t(344) = .94, p = .35$ ).

We again tested whether the psychological ownership measure could serve as a mediator between the condition assignment and the contribution measure. The mean indirect effect from the bootstrap mediation analysis is positive and significant ( $a \times b = 1.096$ ), with a 95% confidence interval excluding zero (.363 to 1.83). In the indirect path, the manipulations of ownership significantly increase psychological ownership by  $a = .572$ ;  $b = 1.92$ , so holding constant condition, a unit increase in psychological ownership significantly increases willingness to donate by \$1.92. The direct effect of condition  $c$  (.697) is no longer significant ( $p = .292$ ), indicating indirect-only mediation.

### *Discussion*

Across three types of scenarios for either public resources (a local fish pond, a local boat club) or resources owned by other private groups (a family orchard), we find that changing the scenarios to manipulate the antecedents of psychological ownership can affect both measures of psychological ownership and other dependent variables that capture willingness to invest in, or care for, the resource. Generally, manipulations that affect perceptions of control, knowledge, and investment all increase psychological ownership and investment measures; furthermore, the

psychological ownership measures can serve as mediators between the scenario conditions and the stewardship measures. An unexpected result, however, was that for two types of scenarios (the orchard and the boatclub), the investment manipulation succeeded at increasing psychological ownership but did not lead to higher investment or willingness to pay. We suspect that this may be because the prior investment of time into the resource is already seen as a form of investment, and thus substitutes for a higher willingness to pay. Another way to interpret this is that the investment manipulations are successful at increasing the feelings of ownership toward the public good, but the participants now see themselves as part owners who deserve a discount on additional purchases. While we did not expect this result, it does provide an interesting boundary condition to the question of when greater psychological ownership can and cannot lead to increased investment.

## *STUDY 2: A PUBLIC GOODS LAB EXPERIMENT*

### *Overview and Method*

Study 1 has the disadvantage of being an online study asking participants to judge scenarios with no actual consequences captured in our dependent measures. One concern for such studies, generally, is that the sharing behavior indicated by participants in these kinds of hypothetical studies will break down once actual financial outcomes and incentives are involved. To test whether our psychological ownership manipulations could still affect resource allocation when real money was on the line for participants, we implemented an incentive-compatible lab experiment taken from the experimental economics literature on public goods.

In the standard public goods experiment, participants come into the lab and are matched into groups of multiple members (usually strangers). Each group member is given an initial

allocation of resources, such as \$10. Each individual then gets to privately decide how much of his or her allocation to contribute to a common pot (the “public good”); all money in the common pot is doubled by the researcher and then evenly divided out among the group members. Thus, if there are four members in a group, any dollar contributed by an individual to the pot is returned as only \$.50. In this way, it is in each individual’s self interest to allocate as little of his or her own money as possible to the common good, while still hoping that everyone else will contribute, leading to a strong incentive for free rider behavior.

Our experiment takes this basic design but adds manipulations of psychological ownership to determine how ownership may affect willingness to contribute. We manipulate ownership for two sets of resources: for the original allocation received by the participant when he or she first arrives at the lab, or for the output of the common pot (the public good). This leads to three separate conditions: no manipulation of psychological ownership, high psychological ownership for the participant’s own resources, and high psychological ownership for the common resources. We predict that higher psychological ownership of own resources will reduce contribution levels and higher psychological ownership of common resources will increase contribution levels, both relative to the control condition. Our goal was to have approximately forty participants per condition, for a grand total of 120 participants. Participants were recruited through our campus online study system for participation in two tasks: one online and one in the lab. A total of 123 participants from our campus subject pool completed both tasks. We had 44 participants in the control condition, 39 participants in the high psychological ownership of public resources condition, and 40 participants in the high psychological ownership of own resources condition.

Our manipulation of psychological ownership was completed prior to coming to the lab in person for the study. All participants were asked to complete a project prior to their lab appointment that involved designing their own money. Their task was to design a physical currency, within a predetermined layout size. They could decorate their currency with any pictures or wording that they liked (see Figure 1 for examples). Once the currency was designed, we printed copies of the paper bills that would be used in the experiment. For individuals in the high psychological ownership of own resources, the ten bills they received as their initial allocation were printed from their own design, but they were told that any bills that came from the public good would be standard “generic” bills. For individuals in the high psychological ownership of public resources, the ten bills they received as their initial allocation were generic bills, but they were told that all bills that came from the public good would include their design. For individuals in the control condition, all bills were standard generic bills. Participants in all conditions were allowed to see and inspect the bills prior to deciding their allocations to the public good.

**---Insert Figure 1 About Here---**

Participants came into the lab individually and received instructions specific to their condition assignment, with samples of both their custom bill and the generic bill. They also received their initial allocation of ten bills (either custom or generic) and two envelopes in which they would divide their allocation into bills to “keep” and to “contribute.” They were left in a private area where they could divide their bills. They then returned the “contribute” envelope to the experimenter. The experimenter randomly selected three prior participants from within the same condition, privately counted the common goods contributions from all four group

members, calculated the resulting payoffs, and returned the appropriate number of bills (either custom or generic) to the participant from the common pot. Thus, at the end of this process, the participant holds both the initial bills they had allocated to the “keep” envelope and a set of bills that came from the common good. All instructions for the participants, including a diagram of the process, are provided in appendix 3.

After participants had made their allocations to the public good and the results were tallied and redistributed among group members, each individual completed a survey about their psychological ownership for the initial bills and the public bills. Participants were paid a flat fee of \$3 for doing the bill design in advance of coming to the lab, another flat fee of \$4 for showing up at the lab, and \$0.15 for each bill (of any type) that they held at the end of the exercise, for total payment of \$7.50 to \$10. All payment was done at the end of the lab exercise.

### *Results and Discussion*

We begin by doing a manipulation check to test whether participants, across all conditions, felt higher psychological ownership toward the bills they had created than toward the generic bills. We find that psychological ownership for the custom designed bills ( $\alpha = .93$ ) averages 5.36, significantly higher than the average of 3.33 for the generic bills ( $\alpha = .92$ ,  $t(120)=11.6$ ,  $p<.001$ ). The difference in ownership by bill type is also significant within each condition, but there are no differences in psychological ownership for either the custom bill or the generic bill across conditions (all  $p>.25$ ).

Our primary DV was the amount donated to the common good (versus kept) from the initial allocation of ten bills. We find that participants in the high psychological ownership of own resources condition allocated marginally less of their initial amount to the common pool



( $M_{\text{high-own}}=3.35$ ) than those in the control condition ( $M_{\text{control}}=4.34$ ,  $t(82)=1.70$ ,  $p=.09$ ) and significantly less than those in the high ownership of public resources condition ( $M_{\text{high-public}}=5.59$ ,  $t(77)=4.08$ ,  $p<.001$ ). Furthermore, the common good allocation among those with high ownership of public resources is significantly higher than the control condition (5.59 vs 4.34,  $t(81)=2.03$ ,  $p=.05$ ).

These differences in initial allocation to the common good have a direct effect on both the average size of the overall common good and the resultant payoffs to participants at the end of the task. Each participant was randomly matched to three other participants from within the same condition while calculating the common good, and their collective contributions were doubled by the experimenter. Because allocations to the common good were higher for participants in the high ownership of public resources condition, the average size of the common good was also higher relative to both the control condition (22.54 vs 17.36,  $t(81)=4.53$ ,  $p<.001$ ) and the high ownership of own resources condition (22.54 vs 13.58,  $t(77)=9.00$ ,  $p<.001$ ). The high ownership of own resources condition was also significantly less than the control condition (13.58 vs 17.36,  $t(82)=3.39$ ,  $p=.001$ ). When the common good was then divided and reallocated to the participant, final actual dollar payments to participants (including their retained allocation amounts) were also higher among individuals in the high ownership of public resources condition (versus control: \$2.35 vs \$2.15,  $t(81)=2.51$ ,  $p=.01$ ; versus high ownership of own resources: \$2.35 vs \$2.02,  $t(77)=5.04$ ,  $p<.001$ ).

Also of interest was whether individual variation in psychological ownership for the custom bills could predict whether individuals within each condition kept or contributed more of their initial allocation to the public good. In the control condition, in which participants did not use the customized bills in either their original allocation or the public good payouts,

psychological ownership of the custom bills was not predictive of allocation behavior ( $\beta = -.33$ ,  $p=.21$ ). In the high ownership of public resources condition, in which the custom bills were used as the payout from the common good, individuals with higher psychological ownership of the custom bills contributed higher amounts to the public good ( $\beta = .62$ ,  $p=.02$ ). Finally, in the high ownership of own resources condition, in which the custom bills were used as the initial allocation but generic bills used as the common good payout, individuals with higher psychological ownership of the custom bills contributed lower amounts to the public good ( $\beta = -.75$ ,  $p=.004$ ).

The results of Study 2, an experimental lab study with real incentives, demonstrate that a manipulation to increase psychological ownership of either a privately held good (the initial allocation) or the common public good can affect subsequent decisions of how much to contribute toward the public good. Relative to the control, participants who felt high individual psychological ownership of the common pool or shared resource were more likely to contribute to it. Their higher allocations to the public good led to the overall public good being larger, and subsequent payoffs to those participants also being larger. Furthermore, even within this condition, individual differences in feelings of ownership led to higher contribution levels. In contrast, in the condition where participants felt high ownership toward their initial allocation, contribution levels were lower, the public good was significantly smaller, and ultimate payoffs were also lower.

### *STUDY 3: FIELD EXPERIMENT AT A LOCAL PUBLIC LAKE*

#### *Overview and Method*

While Study 2 demonstrated that people were more likely to invest in a shared resource in which they felt psychological ownership, we were interested in examining another form of stewardship. This field study was designed to increase individual psychological ownership of an actual public resource, a lake, and to observe the resulting stewardship of the lake, operationalized as picking up trash in the lake.

The lake where we conducted this study is 217 square miles with a maximum depth of 83 feet. Participants in the study were patrons of an outdoor equipment rental service. The rental service offers a multitude of outdoor equipment for rental. For our study, we surveyed patrons renting kayaks. Kayaks were chosen for several reasons. First, for most kayak patrons, this is their first experience boating on this lake. This lessens the chance that they already feel a sense of ownership due to frequent experience with the lake. Second, kayaks are rented frequently. Other types of boats such as canoes are rented less frequently, which would result in an insufficient number of participants. Also, most kayaks are rented by one person so that it is easier to observe individual behavior. Finally, kayaks have the capacity to carry trash. Stand up paddle boards, which are also a very popular rental item, do not have this capacity.

We manipulated an increase in psychological ownership of the lake by having half of the kayak renters think of a nickname for the lake, which is a form of investing the self, an antecedent of psychological ownership. In the naming condition, we first had the renters write down a nickname for the lake before they went out on the lake to kayak. We encouraged them to say the nickname both to themselves and out loud as they were out kayaking. In the control condition, kayakers rented the kayaks as usual.

This study was run over three weeks. Each morning, unbeknownst to the kayakers, we had a person on a paddleboard go out and plant four pieces of floating object trash in the lake,

anchored so that we could control the location of the trash. The objects were two flip-flop sandals of different colors and two water bottles. The items were placed far enough apart so as not to appear 'planted' and were anchored to ensure consistent placement for all participants and visibility for the experimenters. We wanted to ensure that each kayak would be forced to be within 6 feet of a piece of planted trash no matter what angle the kayak went out or returned. We also wanted to be within watching range of the trash so that we could observe attempts at trash pick-ups with binoculars from the shore. Please see Figure 2 for pictures of the kayak rental area.

**---Insert Figure 2 About Here---**

As patrons arrived, when it was determined that they intended to rent a kayak, an employee of the outdoor organization in the office asked patrons to participate in the study. If the kayak renter agreed, the office person randomly selected them to participate in the control or the manipulation condition. Participants in the control condition received a blank sheet of paper with a number to bring to the boat area. Participants in the manipulation condition were given a sheet of paper which asked them to think of, and write down, their own nickname for the lake, and bring this to the boat area.

All kayakers were given identical safety and instructional procedures and were told that 'it is common practice to pick up any objects or trash you find floating in the lake.' The kayakers were then launched by employees of the rental company in an identical manner from the pier. At least two experimenters, one with a pair of binoculars, viewed the participants as they exited and entered the kayak launch area and recorded any attempts to pick up the floating objects. After the

kayak was returned, we gave them a short survey that had measures of psychological ownership of the lake, self-reported trash pickups, satisfaction with the kayaking experience and cleanliness of the lake (see appendix 4 for survey items).

Our key independent measure was whether they thought of a nickname for the lake and our key dependent variable was their attempt to pick up the trash. Beside psychological ownership of the lake, we also measured feeling of association and affiliation with the organization providing the kayak rental and two control variables: prior usage of the lake and future usage of the lake.

### *Results and Discussion*

We had 81 kayakers in the no naming condition and 54 kayakers in the naming condition. We had to end the study sooner than anticipated as there were complaints from local powerboats about the possibility of the anchored trash being caught in their motors. Since our conditions are not perfectly balanced, we begin by comparing several of our demographic and background measures between the conditions to ensure that participants are similar in their prior experiences and history with the lake. The two groups perceived the lake as equally clean (5.42 vs 5.48,  $t(133) = -.23, p = .82$ ), have similar prior experience in using the lake (1.31 vs. 1.28,  $t(133) = .34, p = .74$ ), and have equal plans for using the lake again in the future (6.40 vs 6.39,  $t(133) = .03, p = .98$ ). We do find marginally higher satisfaction with the experience among individuals who were in the naming condition (6.52 vs. 6.74,  $t(133) = -1.82, p = .07$ ).

As a manipulation check, we asked renters whether they thought of a nickname for the lake. 98% of renters in the nickname condition indicated they had thought of a nickname, while only 1% in the control indicated they had thought of a nickname. Of those that thought of a

nickname, 49% indicated that they said the nickname out loud at least once and 79% said that they said the name to themselves.

Our primary dependent variables were the observed and self-reported attempts to pick up floating trash in the lake, and the three item psychological ownership measure for the lake ( $\alpha = .94$ ). Of the 54 individuals in the naming condition, we observed 22 (41%) attempt to pick up the piece of floating trash, compared to only 6 (7%) of the 81 individuals in the no naming condition ( $\chi^2(1, 135) = 22.06, p < .001$ ). When participants were asked whether they actually did pick up trash from the lake, 15 (28%) of the naming condition individuals and 6 (7%) of the no naming condition individuals reported that they had ( $\chi^2(1, 135) = 10.11, p = .001$ ). Note that these two variables are slightly different because one reports attempts and the other reports successes; many kayakers who attempted to pick up our staged trash were unsuccessful because it was weighted down.

We also find differences in psychological ownership toward the lake depending on condition, with kayakers who were asked to give the lake a nickname reporting significantly greater psychological ownership, as expected (2.78 vs. 4.64,  $t(133) = -6.67, p < .001$ ). Additionally, individuals who were able to nickname the lake reported feeling a stronger association and affiliation with the Outdoor program (4.07 vs. 4.94,  $t(133) = -2.95, p = .003$ ). The effects of condition on both the attempts measure and the psychological ownership measure are significant even with the other control variables, such as prior usage, satisfaction, and demographics included in the model (a logistic regression for attempt yields  $\beta = 2.07, t = 3.88, p < .001$  for condition and  $p > .46$  for all other variables; a regression for psychological ownership yields  $\beta = 1.83, t = 6.23, p < .001$  for condition and  $p > .12$  for all other variables).

Finally, we tested whether psychological ownership of the lake mediates the relationship between the nicknaming condition and the attempts to pick up trash from the lake. The mean indirect effect from the bootstrap mediation analysis is positive and significant ( $a \times b = .111$ ), with a 95% confidence interval excluding zero (.031 to .192). In the indirect path, the experience of naming the lake significantly increases psychological ownership by  $a = 1.86$ ;  $b = .060$ , so holding constant the naming condition, a one unit increase in psychological ownership does significantly increase attempts to pick up trash. The direct effect of condition c (.222) also remains significant ( $p = .002$ ), indicating complementary (partial) mediation.

### *GENERAL DISCUSSION*

There has been a call to broaden the scope of problems studied in the field of marketing (Grewal 2017), as well as encouragement to use marketing knowledge to address issues of sustainability for public resources (Griskevicius, Cantú, and van Vugt 2012; Shultz and Holbrook 1999). The tragedy of the commons has been a well-established problem for common goods for decades, and policy researchers have struggled to develop solutions that can encourage community members to better care for those public resources. While most proposed solutions focus on restructuring incentives or invoking social norms, we propose that an individual-level behavioral intervention of increasing psychological ownership may be able to affect non-owners' behavior toward these resources. In our studies, we investigate how three antecedents of psychological ownership – investing the self, control, and intimate knowledge of the resource, can be manipulated to increase psychological ownership. This increase in psychological ownership results in better stewardship of public resources.

In our pilot study, a field experiment, we use one of those antecedents (control) to directly manipulate feelings of psychological ownership and find that a greater feeling of ownership leads to better care of the resource (i.e., a cleaner hotel room). These findings suggest interesting solutions for both marketers and policy makers who wish to encourage greater care of resources by non-owners. For example, in our studies, both rental car companies and hotels may benefit by increasing feelings of ownership among their guests. Rental car companies could strengthen these feelings by encouraging customers to not only choose their own car from the lot (control), but also to name the car and customize aspects of its appearance (investing the self). Beyond the benefits of higher satisfaction and better stewardship of the resource, firms who encourage conservation behavior have recently been shown to also save money (Wang, Krishna and McFerran 2017), so long as they do not seem to be bragging about their prosocial behavior (Berman, Levine, Barasch and Small 2015). As a potential solution to these tradeoffs, we show that hotel chains may be able to both increase satisfaction and reduce cleaning costs by also implementing choice and customization; in fact, Hilton hotels has released a smartphone app that allows exactly these benefits (Forgione 2014).

In our second pilot study using rental cars, we illustrate that choosing a car (control) and renting for a longer period (intimately knowing), two other antecedents of psychological ownership, are correlated with a feeling of ownership. These pilot findings set the stage for our three studies, all of which show that increasing individual psychological ownership over a shared resource increases stewardship of that resource. Study 1 was a scenario based study using three shared resources; an orchard, a fish pond and a boat club, and revealed that subtle manipulations of the antecedents of ownership increase psychological ownership which also increased various measures of stewardship, including the willingness to reinvest in the fish pond and a willingness



to contribute to boathouse upgrades. Study 2 used an experimental economics public goods paradigm and found that even when participants' payoffs were directly affected by their allocations, they still invested more in the common resource when they felt high individual psychological ownership for the shared resource. Finally, Study 3 both answered the call for more field studies in marketing (Gneezy 2017; Meyer 2017) and illustrated that people who invested themselves in nicknaming a lake felt more ownership toward the lake, and were more likely to care for the resource, measured as picking up trash while out kayaking.

While we focus on cases of public goods, these results can also have implications for the sharing economy, in which consumers are temporarily using resources that belong to other community members. Sharing is prevalent and growing in marketing (Belk 2013; Lamberton and Rose 2012) and taking care of these shared resources is an important concern for managers of these shared systems. These findings can inform ways to increase care for not only for shared objects (e.g. bicycle sharing, car sharing) and space sharing (office spaces, apartments) but also for social issues such as reducing energy consumption.

It is also worth noting that we found in the lake study that increasing psychological ownership for the shared resource, the lake, also increased the feeling of affiliation towards the organization that rented the kayaks. We also find higher satisfaction for the kayaking experience, just as we found higher satisfaction among the hotel guests who selected their own room. These halo effects could be an additional bonus for organizations that increase the feelings of ownership towards a product or object and should be further investigated. While we increased individual psychological ownership (e.g., this is *my* lake), other ideas for increasing psychological ownership in consumer and policy contexts may come from research on collective psychological ownership (e.g., this is *our* lake) which has been studied in work environments

(Pierce and Jussila 2010). Just as increasing collective ownership has positive effects for morale and satisfaction in work environments, increased ownership among consumers in these types of marketing relationships could lead to higher ultimate satisfaction with the offering.

On the flip side, there may be situations where decreased ownership is helpful for encouraging individuals to relax their grip on certain resources. There is evidence that older consumers may have difficulty in disposing of possessions (Price, Arnould and Curasi 2000). While we used the antecedents of psychological ownership as levers to increase the feeling of psychological ownership, they could also be used to *decrease* the feelings of ownership, which may facilitate disposition of items. For example, limiting the physical contact or physical control of a possession by putting it in a more remote location that limits the accessibility of the object may lessen ownership feelings, just as a parent may move a box of children's toys to the garage before ultimately donating it to charity. High levels of psychological ownership have been found to predict non-optimal early claiming of Social Security benefits by retirees (Shu and Payne 2013); interventions for reducing strong feelings of ownership for societal resources may be useful for improving individual outcomes within such choice environments.

Examples abound of non-owners who make the effort to care for shared resources, whose behavior seems to imply a high psychological ownership for those items. For example, community members are known to "adopt" sections of highway, neighborhood fire hydrants, community gardens, and other shared spaces, which they then maintain. Large numbers of dedicated football fans willingly volunteer to clear snow from their favorite team's stadium for minimal pay (e.g., Clayton 2012) and thousands of individuals build and maintain Little Free Libraries in their communities (Guarino 2015). The studies presented here offer some initial evidence of the psychology of ownership that may underlie such generous behaviors.

Furthermore, additional exploration of manipulations that can increase ownership for shared resources, such as in our field experiment, may lead to interventions with important policy interventions. We hope that these ideas will inspire other researchers to also get involved in these efforts.

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FIGURE 1: PUBLIC GOODS EXPERIMENT SAMPLE CURRENCY



FIGURE 2: LAKE STUDY: KAYAKS WAITING TO BE RENTED, PADDLEBOARD GOING OUT TO PLANT TRASH, TRASH ON ANCHORS



## APPENDIX 1:PILOT STUDY 2, RENTAL CAR MATERIALS

Think back to while you were using the vehicle. During that time, how much did you agree with each of the statements below?

*Psychological Ownership Items, all 1-7 with 1 = “strongly disagree” to 7 = “strongly agree”*

I felt personal ownership of the vehicle.

I felt like this was my vehicle.

I felt like I owned this vehicle.

*Satisfaction*

How satisfied were you with your vehicle rental experience?

Very satisfied --- not at all satisfied (7 point scale)

*Cleanliness of Vehicle*

How clean was the vehicle when you returned it to the rental agency?

Not very clean --- spotless (7 point scale)

*Damage*

Was there any damage to the vehicle when you returned it to the rental agency?

Some damage --- Perfect condition (7 point scale)

*Gas*

Did you fill the vehicle with gas before returning it? Yes/no

## APPENDIX 2: STUDY 1 MATERIALS

### *Local Family Orchard*

#### *No psychological ownership*

There is a local family orchard near your home filled with peach trees. The peaches from the grocery store, which usually sell for \$1.50 to \$2 per pound, are pretty good but the fresh ripe peaches from the orchard taste even better. One Saturday afternoon while peaches are in season, you stop at the orchard's roadside stand to buy a pound of already picked fresh peaches.

#### *Control to increase psychological ownership*

There is a local family orchard near your home filled with peach trees. The peaches from the grocery store, which usually sell for \$1.50 to \$2 per pound, are pretty good but the fresh ripe peaches from the orchard taste even better. Plus, you enjoy being able to walk around among the trees and hand-select the fruit until you fill your bag. One Saturday afternoon while peaches are in season, you stop and spend the time walking through the orchard to pick a pound of fresh peaches.

#### *Knowledge to increase psychological ownership*

There is a local family orchard near your home filled with peach trees. You've visited this orchard ever since you were a child, running through the trees, and you know every inch of it. The peaches from the grocery store, which usually sell for \$1.50 to \$2 per pound, are pretty good but the fresh ripe peaches from the orchard taste even better. One Saturday afternoon while peaches are in season, you stop at the orchard's roadside stand to buy a pound of fresh peaches.

#### *Investment to increase psychological ownership*

There is a local family orchard near your home filled with peach trees. Last year, you volunteered at the orchard on a few summer weekends to help with some maintenance, such as painting fences and trimming the trees. The peaches from the grocery store, which usually sell for \$1.50 to \$2 per pound, are pretty good but the fresh ripe peaches from the orchard taste even better. One Saturday afternoon while peaches are in season, you stop at the orchard's roadside stand to buy a pound of fresh peaches.

### *Stewardship as Willingness to Pay for the Peaches*

How much are you willing to pay for a pound of orchard peaches? Slider \$1 to \$5

*Psychological Ownership Items, all 1-7 with 1 = "strongly disagree" to 7 = "strongly agree"*

I feel personal ownership toward this orchard.

I feel like this is my orchard.

I feel like I own this orchard.

## *Fish Pond*

### *No Psychological Ownership*

At your local public park, there is a fish pond where anyone can cast a line during summer months for a small fee. Enough fishing fees were collected last year that there is money to redistribute to the community. Each community member is entitled to up to \$6. The administrators of the park survey everyone to see how much of their share they would like to receive, and how much they would like to reinvest toward the pond's future upkeep.

### *Control to increase psychological ownership*

At your local public park, there is a fish pond where anyone can cast a line during summer months for a small fee. You are on the committee to help maintain the pond, including making decisions about what fish to stock it with and what dates to allow fishing. Enough fishing fees were collected last year that there is money to redistribute to the community. Each community member is entitled to up to \$6. The administrators of the park survey everyone to see how much of their share they would like to receive, and how much they would like to reinvest toward the pond's future upkeep.

### *Knowledge to increase psychological ownership*

At your local public park, there is a fish pond where anyone can cast a line during summer months for a small fee. You have fished here yourself many times over the years, and have some favorite spots along the shore where you like to cast your line and often get lucky with a big fish. Enough fishing fees were collected last year that there is money to redistribute to the community. Each community member is entitled to up to \$6. The administrators of the park survey everyone to see how much of their share they would like to receive, and how much they would like to reinvest toward the pond's future upkeep.

### *Investment to increase psychological ownership*

At your local public park, there is a fish pond where anyone can cast a line during summer months for a small fee. You made a contribution several years ago when the pond was first being established to help stock it with fish and install comfortable seating around the shoreline. Enough fishing fees were collected last year that there is money to redistribute to the community. Each community member is entitled to up to \$6. The administrators of the park survey everyone to see how much of their share they would like to receive, and how much they would like to reinvest toward the pond's future upkeep.

### *Stewardship as Investment in the Fish Pond*

How much of your \$6 entitlement are you willing to reinvest into the pond? (you will receive the remainder) \$0 - \$6

*Psychological Ownership Items, all 1-7 with 1 = "strongly disagree" to 7 = "strongly agree"*

I feel personal ownership toward this fish pond.

I feel like this is my fish pond.

I feel like I own this fish pond.



### *Local Boat Club*

#### *No psychological ownership*

As part of a new hobby, you recently joined a local boat club. The club is all volunteer, and members are able to use the boathouse and check out boats as long as they return them clean and in good shape at the end of the day. The club's organizing committee has decided that the boathouse could use some upgrades and is encouraging members to contribute to cover the costs.

#### *Control to increase psychological ownership*

As part of a new hobby, you recently joined a local boat club. The club is all volunteer, and members are able to use the boathouse and check out boats as long as they return them clean and in good shape at the end of the day. You joined the club's organizing committee, where you help set rules for use of the boats and track maintenance of the boathouse. You and the committee have decided that the boathouse could use some upgrades and are encouraging members to contribute to cover the costs.

#### *Knowledge to increase psychological ownership*

As part of a new hobby, you recently joined a local boat club. The club is all volunteer, and members are able to use the boathouse and check out boats as long as they return them clean and in good shape at the end of the day. You've been spending a lot of time at the boathouse, hanging out with the other members, and you've noticed several things that could be improved. The club's organizing committee has decided that the boathouse could use some upgrades and is encouraging members to contribute to cover the costs.

#### *Investment to increase psychological ownership*

As part of a new hobby, you recently joined a local boat club. The club is all volunteer, and members are able to use the boathouse and check out boats as long as they return them clean and in good shape at the end of the day. You've been helping out at the boathouse on weekends, repairing and repainting the boats, and you even got to name the newest boat. The club's organizing committee has decided that the boathouse could use some upgrades and is encouraging members to contribute to cover the costs.

### *Stewardship of the boathouse*

How much are you willing to contribute to the boathouse upgrades? \$0 - \$20 slider

*Psychological Ownership Items, all 1-7 with 1 = "strongly disagree" to 7 = "strongly agree"*

I feel personal ownership toward this boat club.

I feel like this is my boat club.

I feel like I own this boat club.

### APPENDIX 3: STUDY 2 (PUBLIC GOODS LAB STUDY) MATERIALS

*(Stage 1 instructions, completed online)*

For this study, we are asking you to design your own currency (i.e., a dollar bill). The currency designed in this part of the experiment will be used in a later part of the experiment, in the lab.

We encourage you to be creative and have fun with your design. Make it as personal and representative of yourself as you can, as if you were running your own private country and could make the currency totally your own!

You can use whatever images and words you would like on your design, but note that since it will be seen by other study participants in the lab, you should avoid anything offensive, and also avoid anything that might obviously give away your identity (for example, do not put your full name on your design). You can use images from clipart, or the web, or other sources that you like.

We recommend that you spend around xx minutes on this task, but there is no time limit. Please keep your design to the size allocated below. Once you are happy with your design, save this document as a new file and email it to xxx. Once we successfully receive your design, you will be eligible for the next part of the study.

Size: 2.1 X 4.6 inches



*(Stage 2 instructions, completed in the lab)*

**This is a simple game with participants grouped into teams of four. Each person is given the same set of instructions and the same choices. Your payoff in the game depends on the decisions you make, as well as the decisions of the other members of your group.**

You are starting the game with an endowment of ten (10) bills. Your personal endowment bills look like this:



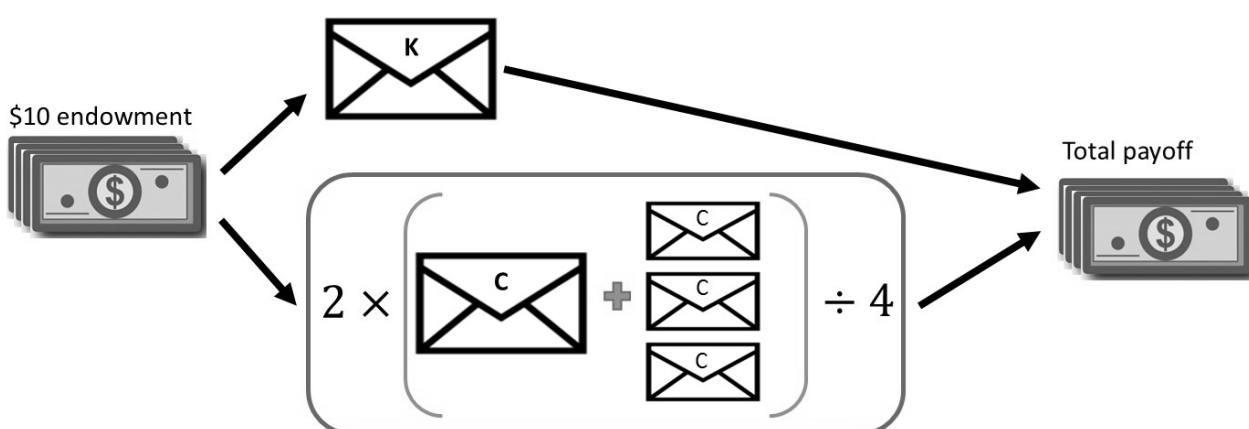
You will next get to choose how much of your ten bill endowment you want to keep, and how much you want to allocate toward the communal purchasing of a common good. Your total payoff from the game comes from three sources: (1) the total amount you **KEEP** from your endowment, (2) the total amount you allocate toward the **COMMON** good, and (3) the total amount that the other three group members put toward the common good. Everything that you keep stays exactly as it is. Everything that you and the other group members put into the common good is doubled in amount by the experimenter and then divided equally among the four members of the group. Put another way, your payoff is determined by this formula:

$$\text{Payoff} = K + (2*(C + G))/4$$

Where K is the amount of your endowment that you **KEEP**, C is the amount you allocate to the **COMMON** good, and G is the total amount allocated to the common good by the other group members. The bills you will receive from the common good will look like this:



The game will proceed as follows. In the next few minutes, you will be given time to think about how much of your endowment you want to keep (K) and how much you want to put into the common good (C). You will divide your endowment bills into two envelopes, marked K and C, according to your decision. You will then bring your C envelope to the experimenter, who will randomly select three C envelopes from three other people who have already visited the lab to play this game. These three random other people are your group members. Their identities, and your identity, will be kept secret throughout the game. The experimenter will count the bills in all four envelopes, calculate the payoff, and give you your allocation of bills from the common good. You should try to end with as much money as possible. The number of bills you hold at the end of the experiment will determine your final payment.



*Post survey after payoff has been completed*

Thank you for participating in our study. Before you go, please answer the following questions.

For part of the study, you used bills that looked like this:



How much do you agree with each of the following statements when thinking about the bills that looked like the one shown above?

	Strongly disagree				strongly agree		
I feel personal ownership of this bill.	1	2	3	4	5	6	7
I feel like this is my bill.	1	2	3	4	5	6	7
I feel like I own this bill.	1	2	3	4	5	6	7

As part of this study, you also got the chance to create your own currency.

How much do you agree with each of the following statements when thinking about the bills that you personally designed in the first part of the study?

	Strongly disagree				strongly agree		
I feel personal ownership of this bill.	1	2	3	4	5	6	7
I feel like this is my bill.	1	2	3	4	5	6	7
I feel like I own this bill.	1	2	3	4	5	6	7

#### APPENDIX 4: STUDY 3 (LAKE FIELD STUDY) MATERIALS

*Psychological Ownership of the Lake, all 1-7 with 1 = “strongly disagree” to 7= “strongly agree”*

I feel personal ownership toward this lake.

I feel like this is my lake.

I feel like I own the lake.

#### *Self-Report Stewardship of the Lake*

Did you pick up any trash or floating objects in the lake? (circle one) Yes / No

If so, how many pieces? \_\_\_\_\_ One \_\_\_\_\_ Two \_\_\_\_\_ Three or more

*Affiliation with Outdoor Organization, all 1-7 with 1 = “strongly disagree” to 7 = “strongly agree”*

I feel like I am part of the Outdoor Organization.

I associate myself with the Outdoor Organization.

#### *Satisfaction with the Experience*

How satisfied were you with your Outdoor experience today?

Not at all satisfied --- Very satisfied (7 point scale)

#### *Manipulation Check*

Did you come up with a nickname for Lake Mendota? (circle one) Yes / No

If so, what name did you use? \_\_\_\_\_

Did you call the lake by the name out loud? (circle one) Yes / No / Did not name the lake

Did you think of the lake by name in your head? (circle one) Yes / No / Did not name the lake

#### *Control Measures*

How much trash did you see in the lake while you were kayaking today?

no trash --- a lot of trash (7 point scale)

How clean was the lake?

very dirty --- very clean (7 point scale)

Prior experience

Including this time, how many times have you used an Outdoor UW kayak?

\_\_\_\_\_ Once \_\_\_\_\_ Two to four times \_\_\_\_\_ Five or more times